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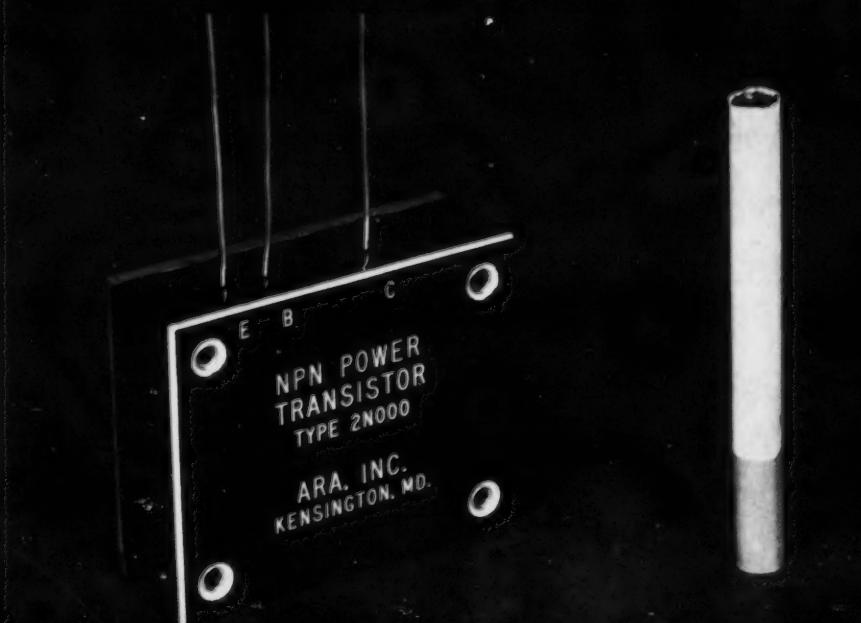
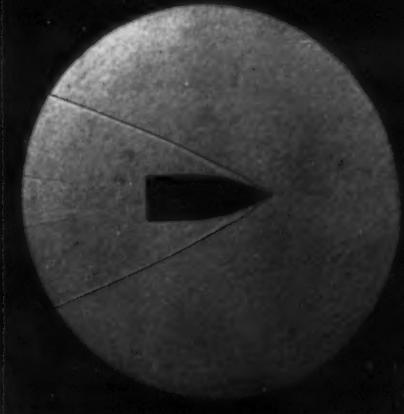
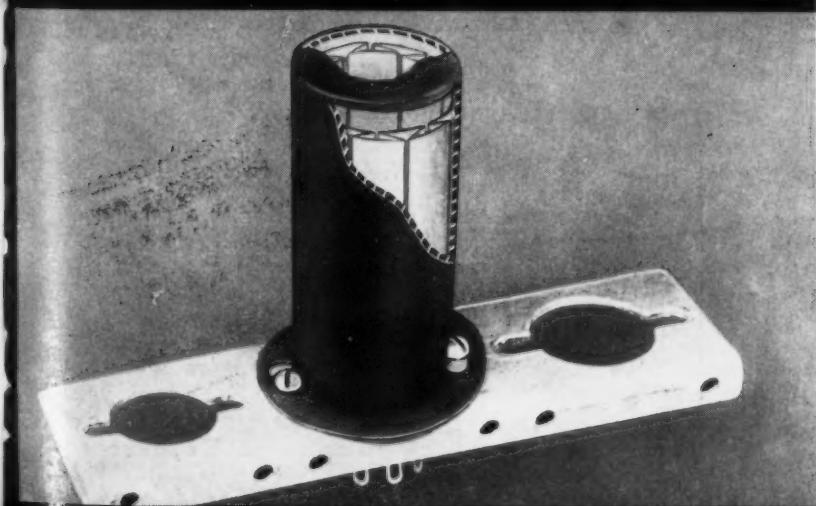


NEW INFRARED MATERIALS are rugged, more sensitive. Page 58.

KERR-CELL SHUTTER "stops" fastest missiles with milli-microsecond exposures. Page 86.

NEW TRANSISTOR COMBINES signal-type sensitivity with power output. Page 67.

HEAT-RADIATING SHIELDS and inserts give tubes longer life, better reliability. Page 64.





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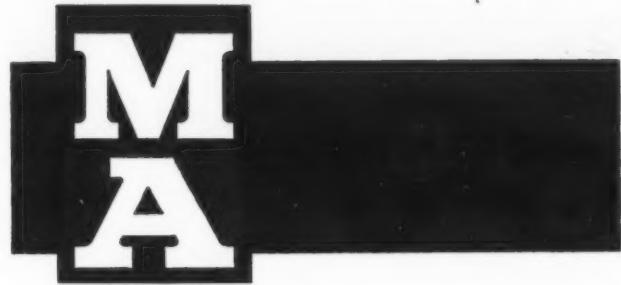


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Editor, MA:

While referring again recently to your article "Modern Digital Techniques" (Jan-Feb 1957), I found that I had a question on the 1247 notation in Table 8. First, I can see no reason for the use of this notation, as its only advantage is the use of not more than two 1's. Second, should not the digital number corresponding to decimal 11 be 10000 rather than 10001 as given?

*Miss Elizabeth Bean, Engineer
Human Eng., Br., NEL, San Diego, Calif.*

It is gratifying to know that our first issue is still providing assistance to our readers. Mr. Ned Chapin, in his recent book, *Automatic Computers* (Van Nostrand), states that the 1247 system is sometimes used in key-sort work and was also used in the MARK-IV computer built in 1952 in Cambridge. Its only apparent advantage is that it provides a type of code check, because any term with more than two 1's must be in error. Your observation on the error in table 8 is correct. However, because this is a binary-coded decimal system, two binary groups are actually needed to write 11, which we should have written as: 0001 0001. A 3-digit decimal number, 297, would be: 0010 1010 1000, etc.

Editor, MA:

We note that in your new book, *Printed Circuits* by Allan Lytel, you mention our Flowsolder method of soldering Printed circuits. We are very grateful for the way in which you deal with the subject and would like to thank you very much for your endeavor. However, in our mutual interest and in order to avoid any confusion in the reader's mind, we would like to draw your attention to some discrepancies:

- (1) Fig. 7-15 doesn't show our Flowsolder machine and should therefore follow after the first sentence of the corresponding paragraph.
- (2) We suggest the term "contact time" instead of "immersion time" in your paragraph under "Advantages." Also, the term "Flowsolder unit" instead of "dipping unit."

*F. Zurbuchen, Electrovert, Inc.,
124 E. 40 St., New York 17, N. Y.*

We are pleased to print this letter as a service to purchasers of *Printed Circuits*, and suitable changes will be made when the next edition is printed.

Editor, MA:

We wish to thank you for the splendid article (Versatile Clutch-Brakes,) you published in your Jan-Feb issue for us. It is indeed rare to have our material so thoroughly understood and condensed copy presented so well.

*F. Haynes, Adv. Mgr.,
Autotronics, Inc., Florissant, Mo.*



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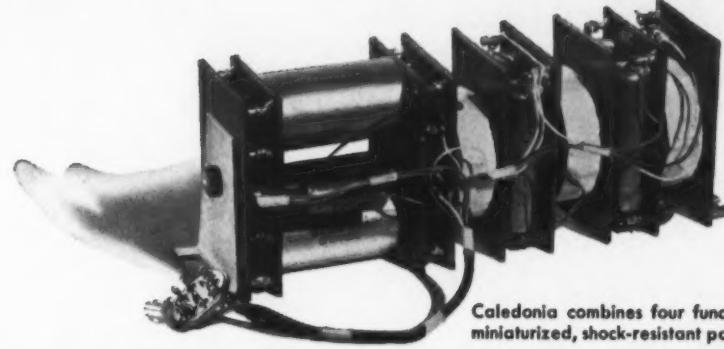
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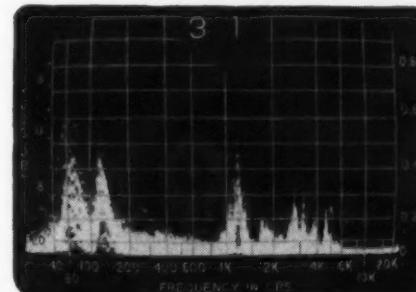
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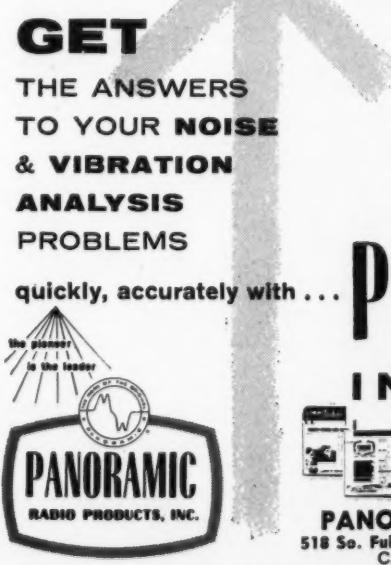
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5965	Twin triode	450	15	2.2 4.0 (a)	High-speed counter or amplifier
6211	Twin triode	300	14	1.4	Medium-speed counter
6414****	Twin triode	450	17	2.0 3.6 (a)	High-speed counter or amplifier
6463	Twin triode	600	30	4.0 7.0 (a)	High-speed counter, amplifier, or core-driver
6525	Thyatron	150	Peak 60, Avg 20	...	Gate or relay-driver
6829****	Twin triode	450	20	2.2 4.0 (a)	High-speed counter or amplifier
6919	Twin diode	200	3.0 (b)	...	Gate or clamp
7036	Heptode	300	16	0.75	High-speed gate

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← Circle 4 on inquiry card.

April 22-25

Annual Meeting of the American Industrial Hygiene Association, Atlantic City, N. J. For additional information write George D. Clayton, Exec. Sec., 14125 Prevost, Detroit 27, Mich.

May 6-8

Western Joint Computer Conference, Co-sponsored by IRE, AIEE and Association for Computing Machinery, at Ambassador Hotel, Los Angeles, Calif. Write David Parry, 6363 Wilshire Blvd., Los Angeles 48, Calif.

May 14-16

Society for Experimental Stress Analysis, Nat. Spring Mtg., Manger Hotel, Cleveland, Ohio. Write A. G. Tokarcik, Goodyear Aircraft Corp., Akron, Ohio.

May 27-28

Second EIA Conference on Maintainability of Electronic Equipment, Electronic Ind. Assn. and Univ. of Pa., Philadelphia. Write EIA, 11 W. 42 St., New York 36, N. Y.

June 2-6

Armed Forces Communications and Electronics Assn., National Convention, Sheraton-Park Hotel, Washington, D. C. Write W. J. Baird, SIGNAL, 1624 Eye St., N.W., Washington 6, D. C.

June 9-13

Fourth International Automation Congress & Exposition, and First Military Automation Exposition, Coliseum, New York. For information write to Richard Rimbach Associates, 845 Ridge Ave., Pittsburgh 12, Pa.

June 16-18

Second National Convention on Military Electronics, PGML IRE, Sheraton Park Hotel, Washington, D. C. Write Geo. Rappaport, IRE 1 E. 79 St., New York 21, N. Y.

August 19-22

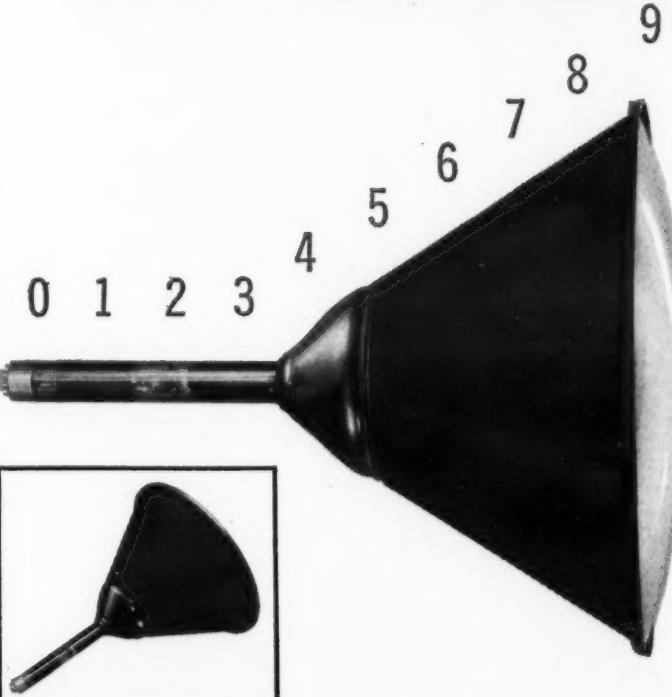
Western Electronic Show & Convention, Pan Pacific Auditorium, Los Angeles, Calif. Write WESCON, 1435 S. La Cienega Blvd., Los Angeles 35, Calif.

September 8-13

First International Congress of Aeronautical Sciences, Palace Hotel, Madrid, Spain. Write I. A. S., 2 E. 64 St., New York 21, N. Y.

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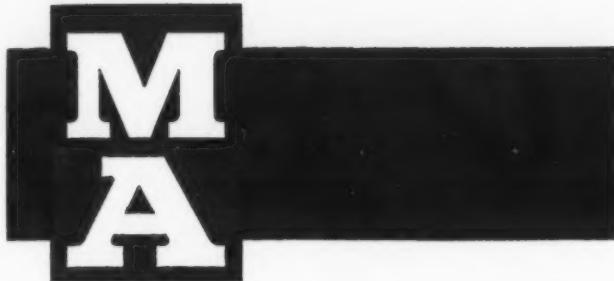
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IRE Show Observations

THE IRE Show in New York, March 24-28 revealed several significant trends in Military Electronics. In the first place, it was certainly a commercial success. The number of exhibitors and of attending engineers testified to the very great business potential in the electronics field. The leading position, both in exhibits and in technical papers, appeared to be taken by components, particularly solid state devices, ferrites, and a great interest in improving the reliability of components. In the solid-state field, the use of silicon and new fabrication techniques to achieve extreme ruggedness and high-temperature compatibility is leading to their use in high-power applications. These new high-gain, high-power transistors and diodes may furnish stiff competition to magnetic amplifiers in the near future.

Interesting new applications of ferrite isolators to reduce intermodulation, and the use of ferrites in a new high-speed computer matrix-type switch were discussed in technical papers. Another trend was observed in the frequency with which digital techniques were mentioned, not only in computer applications, but also in communications. Communications systems engineered for transmission and handling of digital data rather than for analog signals may be standard in the future. A new data-handling application described was the automatic Language Translator, using a photoscopic memory system with a vocabulary of 160,000 Russian entries.

Scatter systems, including those using meteor-trail propagation, continue to receive considerable attention. Single-side-band and filter techniques were thoroughly discussed. Missile telemetering systems came in for technical discussion of their contribution to the radio-interference problem as well as of new techniques of modulation and antenna design.

A new Kerr-cell shutter for ultra-high-speed photography was an outstanding development in the field of test photography.

If somewhat less activity was shown in airborne applications than in former years, it could easily be attributed to the recent emphasis on missiles, and to the fact that many missile applications could not be displayed because of security restrictions.

Fourth International Automation Exposition

Technical Session on Military Electronics and Controls

OUR SALIENT aspects of automation as applied by the Armed Forces will be presented in four papers at the Technical Session on Military Electronics and Controls at the Fourth International Automation Exposition to be held in the New York Coliseum next June. Claude O. Morrison, editor of MILITARY AUTOMATION, will preside as chairman of the session.

Every cooperation has been extended by the Department of Defense to this program in making available leading scientists from each of the major services. An outstanding application of automation in the production of conventional munitions will also be presented by a representative from industry.

Scheduled for the afternoon of June 10, 1958, are the following papers (see next page):

MR. ALOYSIUS KILGALLEN

Mr. Kilgallen received his B. S. in E. E. from the University of Pittsburgh in 1925. For 13 years he was engaged in development of dry solid-state rectifiers with the Westinghouse Corporation Engineering Department. Since 1939 he has been employed in the Bureau of Ordnance, Navy Dept., in research and development of shipboard weapon control systems for guns and missiles, with particular emphasis on shipboard precision radar.



A. KILGALLEN



R. J. GALE

MR. RICHARD J. GALE

Mr. Gale received his B. S. in E. E. from Tufts College in 1944, and the M. S. in E. E. from Yale University in 1947, where he was employed as an instructor in electrical engineering during 1947-48. Since that date he has been engaged in radar research and development in guided missile range instrumentation, countermeasures, and air defense with the Army Signal Engineering Lab. In 1953-55 he served as resident exchange scientist on the staff of the Royal Radar Establishment, Malvern, England. He is a member of IRE and of the American Assn. for the Advancement of Science.

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March-April, 1958

Mr. Philip Rosenberg, director of the Mechanics Research Dept., American Machine Foundry Co., 261 Madison Ave., New York 16, N. Y., will discuss development of automatic machinery for filling 75 or 90 mm shell cases on a continuous basis. This equipment is now in use at the Joliet Arsenal, Ill.

Mr. C. R. Bryan, Technical Director of the Flight Control Laboratory, Wright Air Development Center, ARDC, USAF, Wright-Patterson Air Force Base, Ohio, will discuss automatic control of aircraft, with particular emphasis on peculiar requirements of high performance aircraft as control elements. The discussion will include references to experimental automatic control systems that have "learning ability" and can automatically adjust to their environments.

Mr. Richard J. Gale, Chief Data Systems Branch, Systems Engineering Division, U. S. Army Signal Engineering Laboratories, Fort Monmouth, N. J., will discuss the requirements for Command Post coordination of combat operations, giving specific consideration to certain equipments, man-machine relationships, and feedback data flow aspects of a model system.

Mr. Aloysius Kilgallen, Asst. Branch Head for Technical Matters, Surface Weapons Fire Control Branch, Research and Development Division, Bureau of Ordnance, Navy Dept., Washington, D. C., will discuss aspects of automation employed in control of shipboard surface-to-air missiles, including those issues with which the engineer is confronted when choosing between manual and automatic decision-making in missile control.



P. ROSENBERG



C. R. BRYAN

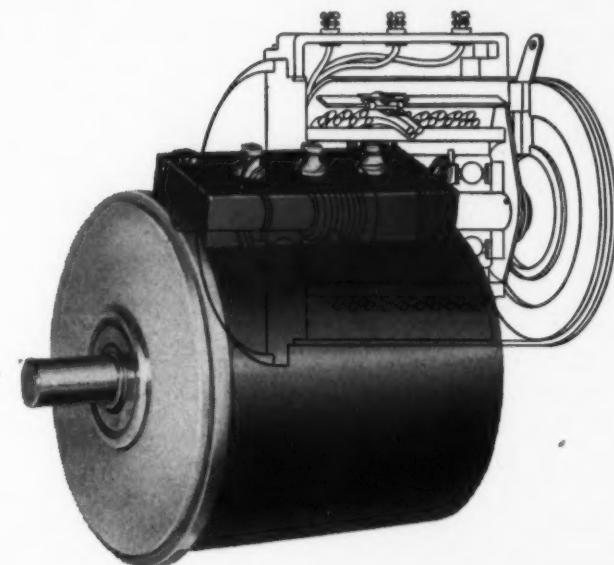
MR. PHILIP ROSENBERG

Mr. Rosenberg has been associated with AMF since 1953, and was made manager of the Mechanics Research Department in 1955. He is a graduate of the Illinois Institute of Technology with a B. S. in M. E. and a member of the American Rocket Society, Sigma Xi, American Ordnance Association, and the Aircraft Industries Association.

MR. C. R. BRYAN

Mr. Bryan received his education at the University of Tennessee, the Eastern Signal Corps School, and the Military College of Science of the British Army. He worked in research and development of radar until his separation from the service in 1946, and with the Air Force Directorate of Laboratories and the Flight Control Laboratory since that date. He is an Associate member of IRE.

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COMPANY BOOTH NUMBER(S)

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Exhibiting: New Products—DigiSyn, Type RD 13 photoelectric shaft position encoder provides angular position data in 13 digit cycle binary code to accuracy of plus or minus 1 digit.

For more information circle 101 on inquiry card.

ADVANCE INDUSTRIES 618-620

For more information circle 102 on inquiry card.

A'G'A' DIVISION, ELASTIC STOP NUT CORP., Elizabeth, N. J. 544

Exhibiting: New Products—Miniature Agastat Time Delay Relays. Regular Products—Time Delay Relays.

For more information circle 103 on inquiry card.

ALDEN SYSTEMS CO., Westboro, Massachusetts 721-723

Exhibiting: New Products—Cost Cutting Laboratory, to solve cost improvement problems. Regular Products—Work centers, conveyors, fact finders.

For more information circle 104 on inquiry card.

AMERICAN LAUBSCHER CORP., New York 19, New York 633

Exhibiting: Regular Products—Swiss Automatic screw machine products, centerless ground and polished products, small stampings and stamping dies, pinions, gears, wheels, segments and racks, color-and-drawn plates, dials, panels and scales, instrument jewels, hair springs and flat springs.

For more information circle 105 on inquiry card.

AMERICAN TELEPHONE AND TELEGRAPH CO., LONG LINES DEPT., New York 17, New York 722, 724, 821, 823

Exhibiting: New Products—Dataphone Service, high speed transmission of data over regular telephone lines, Type A—Digital Subset, direct transmission at 600 words/min., Type B—Recorder Carrier Subset, data recorded "off line" on magnetic tape, transmitted at 800 words/min. Can be used with teletypewriter equipment or several types of business machines and computers. Regular Products—SCATS, BELFAST Manual Tape, 81D1, 82, 83B1 and data systems services for communication and data processing requirements by manual, semi-automatic and automatic teletypewriter systems.

For more information circle 106 on inquiry card.

ASKANIA REGULATOR CORP., (GPE), Chicago 11, Illinois 453-553-554-555-556-650

Exhibiting: New Products—"Electro-jet" units for conversion of low level input signals to hydraulic power for production of thrust or torque in control systems.

For more information circle 107 on inquiry card.

ASSEMBLY PRODUCTS, INC., Chesterland, Ohio 307-309

Exhibiting: New Products—Model 561 Panel Meters; "Memory" Meter retains readings indefinitely; "Differential" Meter-Relay controls rate and/or magnitude of change of a variable; "Proportioning" Control maintains temperatures within total spread of as small as one degree F. Regular Products—Contact meter-relays; All purpose package controls for any variable measurable electrically; Indicating panel meters and pyrometers; VHS non-indicating meter relays.

For more information circle 108 on inquiry card.

ASSOCIATED TESTING LABORATORIES, INC., Caldwell, N. J. 733

Exhibiting: New Products—Low Temperature Environmental Test Chamber, temperature low as minus 100 degrees F., minus 65 degrees F. in 20 minutes. Lucite Salt Spray Chamber, permits visibility of test while in progress. Regular Products—Environmental test chambers and equipment.

For more information circle 109 on inquiry card.

AUDIO DEVICES, New York, New York 635

For more information circle 110 on inquiry card.

AUTOMATIC TIMING & CONTROLS, INC., King of Prussia, Pa. 333-335

Exhibiting: New Products—306 Atcotrol "Duo-Set" Miniature Repeat Cycle Dial Timer; Relay Controller for use in Atcotran Control System with ATC Linear Differential Transformer Transducers; Digital readout Atcotran "Set-Point Transmitter" for use in Atcotran LOTT Control Systems. Regular Products—Electric, electronic, electro-mechanical and electro-pneumatic timing and sequence devices; Industrial and Military control systems and components.

For more information circle 111 on inquiry card.

AUTOMATICS DIVISION, NAA, Los Angeles, California 745-747

Exhibiting: New Products—Inertial navigation systems; flight control systems armament control systems; airborne instrumentation, digital and analog computers.

For more information circle 112 on inquiry card.

AVNET CORPORATION, Los Angeles 34, California 447

Exhibiting: New Products—Connectors

For more information circle 113 on inquiry card.

B & B ELECTRIC MOTOR (See Cushing) 934

For more information circle 114 on inquiry card.

BAKER CO., INC., Biddeford, Maine 334-431-433

Exhibiting: New Products—Ultrasonic Cleaner—Models GW-4, GW-5, Air Flow Ball Bearing Torque Tester; Instrument Ball Bearing Tool Kits. Sterilshield pressurized dust free workspaces, torque tester and comparator; ball bearing torque tester

For more information circle 115 on inquiry card.

BALDWIN-LIMA-HAMILTON CORP., Waltham 54, Mass. 450-452-549-551

Exhibiting: New Products—Disc Indicator for indicating output of SR-4 Load cells, pressure cells, torque pickups. Regular Products—Load cells, pressure cells, torque pickups; Operating model of missile launching platform.

For more information circle 116 on inquiry card.

BECKMAN INSTRUMENTS BERKELEY DIV., Richmond 3, California 421-423

Exhibiting: New Products—EASE Analog Computer
For more information circle 117 on inquiry card.

BENDIX COMPUTER DIV., BENDIX AVIATION CORP., Los Angeles 45, California 313-315

Exhibiting: New Products—Intercom 1000, simplified programming system for the Bendix G-15D Computer. Regular Products—General Purpose Digital Computer G-15D, Digital Differential Analyzer, magnetic tape units

For more information circle 118 on inquiry card.

S. BLICKMAN, INC., Weehawken, New Jersey 539

Exhibiting: New Products—Controlled Temperature Low Humidity Chamber for precision assembly of small components; Positive Pressure Booth with glove panel for precision assembly of small moving parts. Regular Products—Safety enclosures for handling hazardous substances.

For more information circle 119 on inquiry card.

NORMAN BRAGAR CO., INC., Newark 2, New Jersey 426-428-430-432-434

Exhibiting: Products of the following companies—West Instrument Co.; Seam Instrument Corp.; Conax Corporation; Hope Electrical Products Co.; Electric Products Co. See listing under company names for products exhibited.

For more information circle 120 on inquiry card.

BRISTOL CO., Waterbury 20, Connecticut 528-530

Exhibiting: New Products—Syneroverter Choppers, Electronic Components, Recording Automatic Controlling, and Telemetering Instruments; and Socket Screws

For more information circle 121 on inquiry card.

BURLINGAME ASSOCIATES, LTD., Mt. Vernon, New York 732-734

Exhibiting: New Products—Analog Computer, Recorders, Computer Components, Digital Instruments, Pulse Equipment

For more information circle 122 on inquiry card.

BURNDY CORP., OMATON DIVISION, Norwalk, Connecticut 622-624

Exhibiting: New Products—Electrical connectors and electronic components for OEM, Aircraft, Electronics, Appliance, Military. Tooling for the above.

For more information circle 123 on inquiry card.

CLARY CORPORATION, San Gabriel, California 634

Exhibiting: New Products—Data Printers operate from decimal contact closures or from binary coded decimal logic. Regular Products—Parallel-entry numerical data printers, serial-entry numerical data printers, time-data printers, printing timers, tape perforators.

For more information circle 124 on inquiry card.

CLIPPARD INSTRUMENT LAB., INC., Cincinnati 39, Ohio 231

Exhibiting: New Products—Miniature 4-Way Air Valve, push button, cam or solenoid operated; Miniature quick-connect for $\frac{1}{8}$ " tubing; $\frac{9}{16}$ " bore air-hydraulic cylinders. Regular Products—Miniature cylinders, valves, manifolds, fittings, accessories. Automatic resistance comparator, automatic capacitance comparator, R. F. coils and electronic sub-assemblies.

For more information circle 125 on inquiry card.

COBEHN, INC., Caldwell, New Jersey 213

Exhibiting: New Products—Automatic Precision Parts Cleaner for precision electronic and electro-mechanical components. Regular Products—Spray cleaning equipment, solvents, instrument oil, carbon ring oil-less air compressors, bearing tweezers.

For more information circle 126 on inquiry card.

COLEMAN ENGINEERING CO., INC., Torrance, California 631

Exhibiting: New Products—Digital to Analog Positioning System utilizing standard Coleman Digitizer to provide automatic positioning from digital input; Variable Programming Plug provides format changes by means of external jumper wires. Regular Products—Digitizer-decimal, binary, binary coded decimal

For more information circle 127 on inquiry card.

COLUMBIA INTERNATIONAL CORPORATION, L. I. City, N. Y. 918-920

For more information circle 128 on inquiry card.

COMPUTER CONTROL CO., INC., Wellesley 57, Mass. 118

Exhibiting: New Products—FS-10, T-PAC Static Flip-Flop accepts normal 1-mc clocked T-PAC signals as gated input and provides an amplified two-wire static output; SM-10, T-PAC Serial Memory, up to 560 bits of serial storage at a 1-mc repetition rate; DU, T-PAC 30 Element Unit Delay Panel, contains 30, 1 usec delays mounted in a panel to take 1 audio unit of a standard 19" radio relay rack. Regular Products—M-PAC, DC to 100 KC static digital modular; T-PAC 1-Megacycle dynamic digital modules.

For more information circle 129 on inquiry card.

CONAX CORPORATION (Bragar)

Buffalo 25, New York 426-428-430-432-434

Exhibiting: New Products—Roll Temperature Thermocouple Assembly, accurate temperatures on moving rolls or surfaces; Miniature Thermocouple Head, for terminating lead wires; Ceramicouple-Magnesium-Oxide Insulated Thermocouples; Electro Gland, for introducing and sealing power leads. Regular Products—High pressure thermocouple and packing glands pipe clamp and quick disconnect thermocouples, midget thermocouple glands, heads, thermowells, and explosive actuated devices.

For more information circle 130 on inquiry card.

CONSOLIDATED RESISTANCE CO. OF AMERICA, Yonkers, N. Y. 925

Exhibiting: New Products—Wire wound Resistors, Resistance Trimmers, Resistance Decade

For more information circle 131 on inquiry card.

CONTROL, A DIVISION OF MAGNETICS, INC., Butler, Pa. 320

Exhibiting: New Products—Proportioning Reactors, Switching Relays and Transducers for industrial machine control

For more information circle 132 on inquiry card.

COPY-CRAFT, INC., New York 7, New York 401

Exhibiting: New Products—Ormig Selective Data Printers, automatic selection of information from one master for production control, order invoice systems, etc.

For more information circle 133 on inquiry card.

CRAWFORD FITTING COMPANY, Cleveland 10, Ohio 636-638

Exhibiting: New Products—Swagelok Teflon Fittings, all standard sizes and shapes; Swagelok Knurled Nuts, finger tip, leak-proof seals on glass or plastic tubing; Swagelok Bulkhead Adapter in any machinable metal or plastic. Regular Products—Swagelok Tube Fittings, adapters, connectors, danger signal bell plugs, socket weld fittings, butt weld fittings, thread lubricants.

For more information circle 134 on inquiry card.

CUSHING & CO., Bayside 61, New York 334

Exhibiting: New Products—Heller % H.P. variable speed motor control; Hanson-Gorill-Brian packaged thyratron amplifier unit; The automatically regulated semiconductor rectifier power supply unit. Regular Products—Variable-speed motor controls, laboratory mixers, pulse and line products, rectifiers, battery chargers, geared and non-gearred electric motors

For more information circle 135 on inquiry card.

DIT-MCO, INC., ELECTRONIC DIV., Kansas City 5, Missouri 608-610

Exhibiting: New Products—Model 250F-IM Universal Automatic Functional Tester for testing relay systems involving actuators, solenoids, time delay devices, resistors, relays, etc.; Model 2000 Universal Automatic Circuit Analyzer, capacity for testing up to 1980 circuits for continuity and leakage and supplies voltages for energization of relays and other resistive devices automatically. Regular Products—Universal Automatic circuit analyzers, plugboard programmed multiplier sections, automatic functional testers, Militarized portable circuit analyzers.

For more information circle 136 on inquiry card.

ALLEN B. DUMONT LABS., INC., Clifton, New Jersey 403

Exhibiting: Regular Products—"400 Series" line of oscilloscopes

For more information circle 137 on inquiry card.

DYNAMIC GEAR CO., INC., Amityville, New York 327

Exhibiting: New Products—"Dynaco" Miniaturized Stock Gears. Regular Products—Standard precision stock gears; Differentials; Clutches and anti-backlash gears

For more information circle 138 on inquiry card.

DYNAMETRICS CORPORATION, Burlington, Mass. 119-121

Exhibiting: New Products—Model 5C.G Locator, for determining precise weight and center of gravity of missiles. Regular Products—Force beam, manometers, pressure beam, weight and center-of-gravity device, digital barometer.

For more information circle 139 on inquiry card.

ELECTRIC PRODUCTS COMPANY (Bragar)

Cleveland 12, Ohio 426-428-430-432-434

Exhibiting: New Products—Var E. Pack Drive, tachometer feedback maintains constant speed over load range with stepless control through zero speed. Regular Products—Industrial battery charging equipment, synchronous motors and generators, electrolytic motor-generator sets; induction motors, frequency changers

For more information circle 140 on inquiry card.

ELECTRO DEVICES, INC., St. Louis 13, Missouri 241

Exhibiting: New Products—Static Announcer, monitoring and remote control, but contains no moving parts. Control Announcer, performs all remote functions of DPDT relay and all normal alarm and sequencing functions. Regular Products—Single, multiple and sequential alarm systems

For more information circle 141 on inquiry card.

ELECTRO PRODUCTS LABORATORIES, INC., Chicago 40, Ill. 936

Exhibiting: New Products—Transducers: Proximity Pickup Systems, Magnetic Pickups & Over/Under Speed Controls

For more information circle 142 on inquiry card.

ELECTROMATH CORPORATION, Long Island City 4, New York 625

Exhibiting: New Products—Miniature, single and multi-turn line and non-linear precision wire-wound and card-wound potentiometers for critical applications. Regular Products—Precision potentiometers

For more information circle 143 on inquiry card.

ELECTRONIC ASSOCIATES, INC., Long Branch, New Jersey 318-320, 417-419

Exhibiting: New Products—231 R Analog Computer, more computing, less time, less cost, less space; Automatic Digital Input-Output System, servo potentiometer from keyboard or programmed punched types; Transistorized Variplotter Model No. 99.109, twice the plotting speed of 205 series Variplotter. Eight Channel Recorder, Type 99.003; Magnetic Tape Dataplotter System, high speed plotting on X-Y graphs of data recorded in digital form on magnetic tape; 3033B (LP) Dataplotter, converts digital point data to accurate continuous line drawings; Model 26.044 Portable Electronic Digital Voltmeter, provides four figure digital read-out plus sign of analog voltages, 0.1% accuracy.

This is
YOUR TICKET
registration card
and badge

DO NOT MAIL

See instructions reverse side

SHOW HOURS

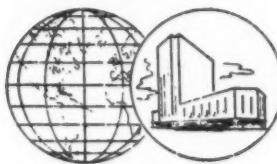
2 to 9 PM, Monday through
Thursday, June 9-12, 1958
2 to 6 PM, Friday, June 13

THE EXPOSITION MANAGEMENT

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FOURTH INTERNATIONAL AUTOMATION EXPOSITION and CONGRESS



EXPOSITION CAPITAL OF THE WORLD

New York COLISEUM

JUNE 9-13, 1958

YOUR INVITATION TO...

THE SHOW

Displays will feature automatic control systems, digital and analog computers, automatic inspection and testing devices, communication systems, feeding and work positioning mechanisms, machine controls, and electronic, electrical, mechanical and electromechanical components.

EXHIBITOR CLINICS

Clinics sessions will comprise 1½-hour classes held in front of operating equipments. Only limited attendance is possible at each class. Advance registration will secure those classes desired by any individual. Fee is \$1 per class; registrant must select 2, 4, 6, or 8 classes. Two are given each day. See other side this sheet for registration form and list of exhibitors planning clinic sessions. More will be added.

TECHNICAL SESSIONS

Especially designed for engineers and executives responsible for automation, each session will include from two to four papers presented by authorities in each field. See list of sessions and registration form other side of this sheet. Fee per session is \$1.00.

COOPERATING SOCIETY

The ASME Materials Handling Division has scheduled four sessions whose theme will be "Materials Handling as a Key to Industrial Automation." They include: Automatic Warehousing; Automatic Materials Handling Systems in Small Plants and Warehouses; Automation on the Production Line; Systems Engineering, Economy and Justifications. Fee for the 4 sessions is \$2 for ASME members; \$5 for non-members. See other side this sheet.

CONFERENCES

Special Executive Conferences lasting two days—four sessions each, include: Human Factors in Systems Engineering (cosponsored by Manhattan College); and Plant Layout for Automation (cosponsored by Plant Layout Technical Workshop of Oakmont, Pa.). Fee for each Conference is \$75.00 Accommodations are limited; early reservation is advised. For details write to Richard Rimbach Associates, 845 Ridge Ave., Pittsburgh 12, Pa.

4th International Automation Exposition

Use TYPEWRITER or print LEGIBLY. Fill in card and stub COMPLETELY, and bring it with you to the Registration Desk at the Coliseum, 1 Columbus Circle, New York City. DO NOT MAIL THIS CARD.

This card for SHOW admittance only, NOT for Clinics or Conferences.

Hours—2 to 9, Monday thru Thursday; 2 to 6 Friday; June 9 to 13, 1958

Your Name _____

Title _____

Company Name _____

Co. Address (STREET) _____

City _____ Zone _____ State _____

Company's Business or Product _____

No other registration is required. For additional FREE tickets, write to
Richard Rimbach Associates, 845 Ridge Ave., Pittsburgh 12, Pa.

USE TYPEWRITER or print legibly. DO NOT DETACH.

Name _____
Title _____
Company _____
City _____
State _____

EXHIBITOR CLINIC CLASSES

1. Digital Computer Principles and Applications
2. Logical Design and Digital Techniques
3. The Analog Computer in Control System Design
4. Compu-Tronics—A new technique
5. Digital Computer Techniques & Practice
6. Electromechanical Computer Elements
7. Principles and Applications of all types On-off Level & Flow Controllers
8. Process Scanning—Logging Techniques
9. Flow Measurement and Control with Turbine Flowmeters
10. Optimal Control of Chemical Processes
11. Weight, Load and Strain Control in Industry
12. Selective Data Printers
13. Precision Dimensional Measurement and Control
14. Plant Economics with Operations Recorders
15. Potentiometer Recorders
16. Gas Analysis by Thermal Conductivity

17. Precision Electromechanical Components and Servos
18. Control Servo Systems
19. Selection and Application of Pressure Switches
20. Photographic Techniques for Automation
21. Office Recording Techniques
22. Mathematical Tools for Rapid Data Analysis
23. Air & Gas Moisture Control
24. Automatic Machine Tools & Measuring Systems
25. Digital and Symbolic Logic—Logic Elements
26. Computer Control of Oil Refineries & Chemical Processing Plants
27. Automatic Test Control & Data Reduction
28. Profit Improvement via Automatic On-Line Process Control
29. Test Time Savings with Closed Loop Control & Data Reduction at Test Site
30. "Work Center System" Approach to Automation
31. Speed Control
32. Structural Parts for Printed Circuitry
33. High-Speed Analog Computers
34. Punched-Card Sensing

TECHNICAL SESSIONS

- A. Data Acquisition and Reduction
- B. Automatic Weighing
- C. Medical Instrumentation
- D. Automatic Control Valves
- E. Military Electronics and Controls
- F. Importance of Measurements
- G. Product Design for Automation
- H. Education for Automation
- I. Manufacturing and Automation
- J. Contribution of Cybernetics to Automation

MATERIALS HANDLING

Automatic Warehousing; Automatic Materials Handling Systems in Small Plants and Warehouses; Automation on the Production Line; Systems Engineering, Economy and Justifications.

MAIL THIS COUPON FOR ADVANCE REGISTRATION IN EXHIBITOR CLINICS AND/OR TECHNICAL SESSIONS

Richard Rimbach Associates, Mgmt. FIAE
845 Ridge Ave., Pittsburgh 12, Penna.

Please expedite my registration.

My Clinic preferences:
(Circle Clinic Number)

1 2 3 4 5 6
7 8 9 10 11 12
13 14 15 16 17 18
19 20 21 22 23 24
25 26 27 28 29 30
31 32 33 34

Number of classes desired

2 4 6 8

Technical Sessions:
(Circle Session Letter)

A B C D
E F G H
I J

Materials Handling:

Fee: ASME Members \$2.

Non-Members \$5. Nature of Business _____

CLINIC FEE—\$1 per class

TECHNICAL SESSIONS—\$1 per session

Name _____

Title _____

Company _____

Address _____

EXHIBITORS and their PRODUCTS

rate of .005 seconds/reading; Model 39.012 High Speed Portable Printer, high speed digital printer for use with EAI Computers or electronic digital voltmeters. Regular Products—Analog Computers, analog recorder, and X-Y Plotters, digital data point symbol and continuous line plotters, analog-to-digital and digital-to-analog computers.

For more information circle 144 on inquiry card.

ELECTRONIC CONTROL SYSTEMS, INC., Los Angeles

25, Calif. 531-533
Exhibiting: New Products—Numerical Control Systems, Automatic Sorting, Testing & Recording Systems & Specialized Data Processing

For more information circle 145 on inquiry card.

ELECTRONS, INCORPORATED, Newark 3, New Jersey

922
Exhibiting: New Products—High Current Thyatron with lugged connections for greater reliability. Regular Products—Thyatron and rectifier tubes

For more information circle 146 on inquiry card.

ENCYCLOPAEDIA BRITANNICA, INC., New York 17, New York

411
Exhibiting: Encyclopaedia Britannica

For more information circle 147 on inquiry card.

ENCYCLOPEDIA AMERICANA CORPORATION, White Plains, N. Y.

331
Exhibiting: New Products—Encyclopedia Americana, Book of Knowledge, Lands & People, Popular Science

For more information circle 148 on inquiry card.

ENGINEERED ELECTRONICS CO., Santa Ana, California

546
Exhibiting: New Products—Packaged circuit plug-in units; dc regulated power supplies; analog computers

For more information circle 149 on inquiry card.

EPSO, INC., Boston 15, Massachusetts

628-630-727-729
Exhibiting: New Products—Electrical and electronic instruments; flight-test instruments; Digital computing equipment

For more information circle 150 on inquiry card.

ERIEZ MANUFACTURING CO., Erie, Pa.

525
Exhibiting: New Products—Magna-Rails and Magna-Rails used in conveying and handling of ferrous materials, parts, etc.; V3B line of H-VL Vibratory Feeders for feeding and controlling bulk materials

For more information circle 151 on inquiry card.

ESS INSTRUMENT CO., Bergenfield, New Jersey

311
Exhibiting: New Products—"Electric Eye" Instruments

For more information circle 152 on inquiry card.

FAIRFIELD ENGINEERING CORP., Springdale, Connecticut

926
For more information circle 153 on inquiry card.

FALCON ALARM CO., Summit, New Jersey

248
Exhibiting: New Products—Liquid Level Alarm, non-electric, self contained, extremely loud signal.

For more information circle 154 on inquiry card.

FALSTROM COMPANY, Passaic, New Jersey

541-543
Exhibiting: New Products—Control Consoles for Guided Missiles; Tracker Cabinets. Regular Products—Control panels and cubicles, graphic panel consoles, racks, chassis. Weldments in aluminum, steel, magnesium, stainless alloys, copper and brass.

For more information circle 155 on inquiry card.

GAP INSTRUMENT CO., Freeport, L. I., New York

945
Exhibiting: New Products—Servo Construction System for building servos and gear trains; Step Transmission System, for remote positioning one or a number of reversible motors up to 120 steps per second; Synchro Positioning Unit, with pairs of synchros geared at common ratio hand positioned with repeatability of one minute. Regular Products—Step Transmission, mechanical integrator.

For more information circle 156 on inquiry card.

GENERAL COMPONENTS, New York 51, New York

937
For more information circle 157 on inquiry card.

GENERAL CONTROLS CO., Glendale 1, California

748
Exhibiting: New Products—"Klikswitch" snap-action and mercury switches. Regular Products—Solenoid and motor valves, relays, limit controls, counting instruments, switches, time switches, pressure and temperature instruments, rotary and linear type actuators.

For more information circle 158 on inquiry card.

GENERAL ELECTRIC CO., Apparatus Sales Div., Schenectady, N. Y.

833
Exhibiting: New Products—D-C Power Supplies

For more information circle 159 on inquiry card.

GENERAL ELECTRIC CO., Lynchburg, Va.

833
Exhibiting: New Products—Controlled Rectifier D-C Power Supply. Regular Products—Voltage stabilized power supplies.

For more information circle 160 on inquiry card.

GENERAL PRECISION EQUIPMENT CORPORATION, New York 38, N. Y.

453-553-554-555-556-650
Exhibiting: See Subsidiaries—Askania Regulator Corp.; General Precision Laboratories; Kearfott Co.; Librascope, Inc.

For more information circle 161 on inquiry card.

GENERAL PRECISION LABORATORIES, INC., Pleasantville, N. Y.

453-553-554-555-556-650
Exhibiting: New Products—Airborne navigation systems

For more information circle 162 on inquiry card.

GENERAL TRANSISTOR CORPORATION, Jamaica 35, New York

728-730
Exhibiting: New Products—Bilateral and Drift Transistors; Germanium Computer Diodes; Bobbinless Precision Wire Wound Resistors; End View Phototransistors. Regular Products—Transistors
For more information circle 163 on inquiry card.

GERBER SCIENTIFIC INSTRUMENT CO., Hartford, Conn.

843-845
Exhibiting: New Products—Gerber Variable Scales, Gerber Grapho-analogue's, Gerber Data Readers, Gerber Derivimeters and Gerber Equimeters

For more information circle 164 on inquiry card.

DATEX DIV., G. M. GIANNINI & CO., Monrovia, California

415
Exhibiting: New Products—Automatic Batch Control Systems, different formulas selectable from telephone type dial; C-711 Encoder, 1024 positions over 360 degrees; C-900 Encoder, 2400 positions over 360 degrees rotation; CU-102 Control Unit with SP-101A Pressure Scanner, the SP-101A pneumatically switches twelve pressures into a single output, the CU-102 provides additional voltage and control functions; MC Datex-Monroe Data/Log, entry of up to 14 digits simultaneously; SC-101 Input Scanner, sequentially switches ten low level millivolt or thermocouple signals; T-121 Translator, for use with Encoders where continuous indication of Encoder position is desired. DC-104 Digital Clock, provides digital output in hours and minutes. Regular Products—Pressure and temperature logging systems, Encoder display.

For more information circle 165 on inquiry card.

GLENGARRY PROCESSES, Bayshore, L. I., New York

648
Exhibiting: New Products—Automatic data logger, scanning and annunciator equip.

For more information circle 166 on inquiry card.

GORN ELECTRIC CO., INC., Stamford, Connecticut

837
Exhibiting: New Products—"Gornet" and "Gornector" parts and connectors to build printed circuit board packages. Regular Products—Pressure, float and flow switches; Miniature electronic connectors

For more information circle 167 on inquiry card.

GORRELL & GORRELL, Westwood, New Jersey

826
Exhibiting: New Products—Timers, Graphic Recorders

For more information circle 168 on inquiry card.

GOW MAC INSTRUMENT CO., Madison, New Jersey

626
Exhibiting: New Products—Gas Chromatography

For more information circle 169 on inquiry card.

W. & L. E. GURLEY, Troy New York

714-716
Exhibiting: New Products—Reticles, Precision angle measuring devices, special instruments, precision patterns on glass and metal.

For more information circle 170 on inquiry card.

HANSON-GORRILL-BRIAN, INC., Glen Cove, New York

828
Exhibiting: New Products—Gas Chromatography

For more information circle 171 on inquiry card.

F. WARD HARMAN ASSOCIATES, Div. Marine Model Co., Halesite, L. I., New York

831
Exhibiting: New Products—Plastic components for scale model building construction and automatic processing of materials. Regular Products—Two and three dimensional layout materials; Industrial scale models and training aids.

For more information circle 172 on inquiry card.

A. W. HAYDON CO., Waterbury, Conn.

822, 824
Exhibiting: New Products—Electronic Time Delay Relays; Digital and Laboratory Stop Clocks; Stepper, Miniature Timing and Electronically Governed D. C. Motors; Subminiature Repeat Cycle Timers, Time Delay Relays, Elapsed Time Indicators. Regular Products—AC & DC timing motors, custom designed timing devices, elapsed time indicators, intervalometers, repeat cycle timers, stop clocks, time delay relays.

For more information circle 173 on inquiry card.

HEISE BOURDON TUBE CO., Newton, Connecticut

921-923
Exhibiting: New Products—Thermal Compensator, precision Bourdon tube pressure gauge automatically compensates for thermal effects. Regular Products—High precision pressure gauges.

For more information circle 174 on inquiry card.

KARL HEITZ, INC., New York 17, New York

612
Exhibiting: New Products—Robot fully automatic 35mm cameras; ALPA Single Lens Reflex 8 mm movie cameras and lenses for micro and microphotography; Camec Single Lens Reflex 8 mm movie cameras for medical, research, close-up photography. Regular Products—Primos enlargers; Kern Stereo microscopes and optical flats; Kinoptik 16, 35 and TV camera lenses; Sinar Viewcamera; Omag pocket microscopes; Linda slide mount.

For more information circle 175 on inquiry card.

GERALD K. HELLER CO., (See Cushing)

934
Exhibiting: New Products—Electronic motor controllers

For more information circle 176 on inquiry card.

CARL HIRSCHMAN CO., INC., Manhasset, New York

529
Exhibiting: New Products—High-precision machine tools

For more information circle 177 on inquiry card.

HOPE ELECTRICAL PRODUCTS CO., Hillside, N. J.

426-428-430-432-434
Exhibiting: New Products—Weatherproof & Explosionproof circuit breakers, motor starters, apparatus and instrument enclosures. Regular Products—Cast iron, aluminum and brass boxes for weather-proof and explosion proof applications.

For more information circle 178 on inquiry card.

THE INDUSTRIAL PRESS, New York 13, New York

846
Exhibiting: Regular Products—Machinery Magazine; Trade papers and engineering books.

For more information circle 179 on inquiry card.

INSTITUTE OF RADIO ENGINEERS, New York 36, New York

217
Exhibiting: New Products—Publication of the IRE

For more information circle 180 on inquiry card.

INSTRUMENT DEVELOPMENT LABS., INC., Attleboro, Mass.

726
Exhibiting: New Products—Miniature Sampling Switch, 3/4" cube

containing motor, gear box and 135 low level switching elements being scanned at 900 samples per second; Inertial Velocimeter, 1 1/2" dia. x 3 1/2" containing seismic mass, integrator, heating coils, and exhibiting short time constants, wide range and compliance with Military environment. Regular Products—Shaft angle converter; PDM and PAM telemetering commutator; High speed sampling switch; Color tye

For more information circle 181 on inquiry card.

INSTRUMENT MOTORS, Irvington, New Jersey

711
Exhibiting: New Products—Motors & Generators and Servos

For more information circle 182 on inquiry card.

INSTRUMENTS PUBLISHING CO., INC.

Exhibiting: New Products—INSTRUMENTS & AUTOMATION, INSTRUMENT & APPARATUS NEWS, MEDICAL ELECTRONICS NEWS, MILITARY AUTOMATION

For more information circle 183 on inquiry card.

INTERNATIONAL BUSINESS MACHINES CORP., New York 22, N. Y.

639-641
Exhibiting: New Products—Automatic Production Recording Equipment

For more information circle 184 on inquiry card.

KEARFOTT CO., Clifton, New Jersey

453-553-554-555-556-650
(See General Precision Equipment Corp.)

For more information circle 185 on inquiry card.

KYBERNETES CORPORATION, New York 16, New York

218-220-317-319
Exhibiting: New Products—Automatic data logger, scanning and annunciator equip.

For more information circle 186 on inquiry card.

LARSON INSTRUMENT CO., Tarrytown, New York

437
Exhibiting: New Products—30 Channel Recorder and Contact Meters

For more information circle 187 on inquiry card.

LAVOIE LABORATORIES, INC., Morganville, N. J.

709
Exhibiting: New Products—Automatic Fault Locating Equipment, ROBOTESTER, High Precision Frequency Standards and Measuring Equipment

For more information circle 188 on inquiry card.

GERARD G. LEEDS CO., INC., Great Neck, New York

735
Exhibiting: New Products—Programmable Power Supplies for automatic testing of transistors, tubes and other electronic components; High Speed Digital Voltmeters, Ohmmeters and fully automatic test systems; "Otrac" Oscillogram Trace Reader; Automatic Mass Spectrometer Leak Detection System; Automatic Vacuum Processing Systems.

For more information circle 189 on inquiry card.

LIBRASCOPE, INC., Glendale, California

453-553-554-555-556-650
Exhibiting: New Products—Computers—Controls and Components

For more information circle 190 on inquiry card.

MACHINERY MAGAZINE, New York 13, New York

846
(See Industrial Press)

For more information circle 191 on inquiry card.

MARTIN-DECKER CORPORATION, Long Beach 7, Calif.

632
Exhibiting: New Products—SL and SW load cell systems for measuring compression and tension forces, simplifies load weighing problems. Regular Products—Hydraulic crane scales, lift truck weight indicators, crane weight indicators, test gauges, tensiometers, cable tension indicators, dynamometers.

For more information circle 192 on inquiry card.

MASON, SHAVER & RHOADES SALES, INC., East McKeesport, Pa.

725
Exhibiting: New Products—Automatic Electronic Test Equipment

For more information circle 193 on inquiry card.

MCINTOSH EQUIPMENT CORP., New York 38, New York

248
Exhibiting: New Products—Variable Flow Type Arkon Flow Indicators for wider flow ranges; Ball Type Arkon-Flow Indicators for lower rates. Regular Products—Warrick floatless electrode type liquid level controls; Healy-Ruff pressure, purged air and float type pump controls; Gems float-type flow and level switches; Jarco capacitance probe type level controls; Falcon tank overfill alarms; Flow actuated control multi-pump flow controls; Arkon flow indicators

For more information circle 194 on inquiry card.

METALAB EQUIPMENT CO., Div. Norbute Corp., Hicksville, L. I., New York

818
Exhibiting: New Products—Specialized Laboratory Equipment; Fume Hoods for Radioactive Materials; Chemical Storage Cabinets. Regular Products—Laboratory tables, chemical fume hoods, laboratory fittings and accessories, complete laboratory equipment in metal or wood, natural stone and composition, table tops, sinks and fixtures.

For more information circle 195 on inquiry card.

MILES REPRODUCER CO., INC., New York 3, New York 226
Exhibiting: New Products—"Walkie-Recordall", self-powered conference-dictation recorder, start-stops automatically by actuation of voice or telephone.
For more information circle 196 on inquiry card.

MILLER FLUID POWER DIV., FLICK REEDY CORP., Melrose Park, Illinois 545-547-549-551
Exhibiting: New Products—Model H Power Packed Hydraulic Cylinder for 3000-5000 Psi and Model J Job Rated line; Tru-Seal Leakproof Fittings for threaded connections. Regular Products—Air & hydraulic cylinders; "Miller College of Cylinder Knowledge".
For more information circle 197 on inquiry card.

MICRO SWITCH DIV., MINNEAPOLIS-HONEYWELL REGULATOR CO., Freeport, Illinois 322-324-326
Exhibiting: New Products—"Plug-In-Limit" Switch, instantly replaceable; Modular-mount Pushbutton Switches with two built-in indicator lamps; Proximity Switches, no physical contact; Magnetically-held Lighted Pushbuttons; High-temperature basic switches for long life at 600° F. Regular Products—Precision snap-action switches and assemblies, Mercury switches; Manual toggle, pushbutton and rotary; Splash-proof, explosion proof and hermetically sealed switches; Circuitry in all types.
For more information circle 198 on inquiry card.

MINNESOTA ELECTRONICS CORP., (GPE) 453-553-554-555-556-650
For more information circle 199 on inquiry card.

MONROE CALCULATING MACHINE CO., INC., Orange, New Jersey 346-348
Exhibiting: New Products—Electronic components, magnetic storage drums, input-output equipment, magnetic read-record heads
For more information circle 200 on inquiry card.

MOOG VALVE CO., INC., East Aurora, New York 226
Exhibiting: New Products—Electro-hydraulic servo components and controls
For more information circle 201 on inquiry card.

MYCALEX CORPORATION OF AMERICA, Clifton, New Jersey 117
Exhibiting: New Products—PC Printed Circuit Commutation Switch with Supramica 560F ceramoplastic commutator plates, for telemetering and data processing. Regular Products—Mycalex glass-bonded mica; Supramica ceramoplastics; Synthamica synthetic mica; Mycalex TM Commutation switches with Supramica 555 ceramoplastic commutator plates.
For more information circle 202 on inquiry card.

NATIONAL CASH REGISTER CO., Dayton 9, Ohio 522-524-621-623
Exhibiting: New Products—Compu-Tronic, general purpose accounting machine with electronic multiplication for billing, payroll, inventory, etc.
For more information circle 203 on inquiry card.

NEW HERMES ENGRAVING MACHINE CORP., New York 3, New York 906
Exhibiting: New Products—Model I-R Pantographic Engraving Machine for electronic, instrument and sign-making industries; Beveler

Portable Edging Machine for plastic or metal name-plates. Regular Products—Portable engraving machines; Bench-type engraving machines; attachment for drilling printed circuits.
For more information circle 204 on inquiry card.

AUTONETICS DIV., NORTH AMERICAN AVIATION, INC., Downey, California 745-747
Exhibiting: Recomp 11, 200 pound, versatile, high speed, general purpose computer, fully automatic, floating decimal point arithmetic, rotary magnetic memory has capacity of 4096 words.
For more information circle 205 on inquiry card.

NORTH AMERICAN VAN LINES, INC., Fort Wayne, Indiana 731
Exhibiting: Improved methods for moving electronic and high value products
For more information circle 206 on inquiry card.

NORTHROP AIRCRAFT, INC., Hawthorne, California 737-739
For more information circle 207 on inquiry card.

OPTICS MANUFACTURING CORP., Ind. Div., Philadelphia, Pa. 435
Exhibiting: New Products—Complete line of plastic lenses and industrial accessories
For more information circle 208 on inquiry card.

OPTO-METRIC TOOLS, INC., New York 13, New York 243-245
Exhibiting: New Products—Floor Model A-F Wilder Micro-Projector, completely self-contained; Leitz Optical Dividing Head reading to two seconds of arc, accuracy of plus and minus two seconds. Regular Products—Optical amplifying gages; Toolmaker microscopes.
For more information circle 209 on inquiry card.

PACIFIC AUTOMATION PRODUCTS, INC., Glendale 1, Calif. 919
Exhibiting: New Products—Cable Systems and Components
For more information circle 210 on inquiry card.

PANDUIT CO., Midlothian, Illinois 247
Exhibiting: New Products—Wiring Tube, spirally cut, non-flammable cable lacing; Cable Former, forms neat, compact cable; Electronic Wiring Duct; Stack Lugs, pressure connector allows numerous wires to be connected to one terminal. Regular Product—Wiring Duct.
For more information circle 211 on inquiry card.

PANELLIT, INC., Skokie, Illinois 718-720-817-819
Exhibiting: New Products—Panalarm Recording Annunciator, print-out identification of selected conditions going off and returning to normal, plus visual/audible signals; Panalog 607 Information System, dual function combining logger and high speed continuous scanner, recorded measurements grouped by processing units, scans all variables recording off-normal values, audible signals. Regular Products—Panalarm annunciators, visual sequence, static magnetic and standard annunciator line.
For more information circle 212 on inquiry card.

PAR METAL PRODUCTS CORPORATION, Long Island City, New York 527
Exhibiting: New Products—Relay racks; cabinets
For more information circle 213 on inquiry card.

EXECUTIVE CONFERENCES—

Tuesday, June 10th, 9:30 A.M., Coliseum

1. **Importance of Measurements**—Canada Room—Chairman: Douglas M. Considine, Hughes Products Div., Hughes Aircraft Company

Tuesday, June 10th, 2:30 P.M., Coliseum

2. **Design for Automation**—Canada Room—Chairman: Robert W. Carson, Managing Editor, Product Engineering.
3. **Automatic Control Valves**—United Nations Room—Chairman: E. Albert Adler, Instrument Engineer, United Engineers & Constructors, Inc.
4. **Military Electronics and Controls**—France Room—Chairman Cdr. Claude O. Morrison, Editor, Military Automation

Wednesday, June 11th, 9:30 A.M., Coliseum

5. **Automatic Weighing**—Canada Room—Chairman: Armand Gaudreau, Consulting Engineer, Gaud-Reau Associates
6. **Manufacturing and Automation**—France Room—Chairman: Stephen Derry, Consulting Management Engineer

Wednesday, June 11th, 2:30 P.M., Coliseum

7. **Medical Instrumentation**—Canada Room—Chairman: Dr. Raymond Jonnard, Assistant Director, Laboratory, Prudential Insurance Company of America
8. **Data Acquisition & Reduction**—United Nations Room—Chairman: Ward O'Connor, Chief Mechanical Engineer, Lummus Company

Thursday, June 12th, 9:30 A.M., Coliseum

9. **Education for Automation**—Canada Room—Chairman: Milton H. Aronson, Editor, Instruments and Automation

Thursday, June 12th, 2:30 P.M., Coliseum

10. **Foreign Developments in Automation**—United Nations Room—Chairman: to be announced

Meeting of Cooperating Societies

American Society of Mechanical Engineers, Materials Handling Division—Theme of Meeting—Materials Handling as a Key to Industrial Automation

Tuesday, June 10th, 9:30 A.M., Coliseum

Automatic Warehousing—South America Room—Chairman: To be announced

Tuesday, June 10th, 2:30 P.M., Coliseum

Automatic Materials Handling Systems in Small Plants and Warehouses—South America Room—Chairman: To be announced

Wednesday, June 11th, 9:30 A.M., Coliseum

Automation on the Production Line—South America Room—Chairman: To be announced

Wednesday, June 11th, 2:30 P.M., Coliseum

Systems Engineering, Economy and Justification—South America Room—Chairman: To be announced

Wednesday, June 11th, 2:30 P.M., Coliseum

Contributions of Cybernetics to Automation—France Room—Chairman: Dr. George Boulanger, Professor, Polytechnique de Mons and l'Université de Bruxelles; President l'Association Internationale de Cybernetique

PIC DESIGN CORP., SUB. BENRUS WATCH CO., East Rockaway, New York 226

Exhibiting: New Products—No Mar Set Screws; Precision Custer Gear and Hub; Precision Internal Gears; Zero Adjustable Coupling. Regular Products—Precision tools, jig legs, studs, heel pins, hex nuts, washers, etc.; Precision shafting, spacers, ball bearings, spur gears. Precision 1, 2, 3 dial hubs, engraved disc dials, miter and level gear shaft hangers, couplings; Speed reducers and differentials

For more information circle 214 on inquiry card.

POST MACHINERY CO., Electronic Products, Beverly, Mass. 44
Exhibiting: New Products—Model "SD-IT" Electronic Decade Counter for medium to fast speed operations. Regular Products—Decade electronic counters

For more information circle 215 on inquiry card.

POTTER AERONAUTICAL CORP., Union, New Jersey 222-224
Exhibiting: New Products—Model D11 Differential Flow Rate System, meters liquids with range of 100 to 1, down to zero flow. Model 35 Bill Printing Totalizer provides printed bill and visual indication of amount delivered, resettable, accumulative flow metered; Mass Gas Flowmeter, samples temperature and pressure of gas. Regular Products—Predetermined counter, electronic counter, specific gravity sensor, frequency converter, flow sensing elements, flow metering systems, rotameter, tachometer frequency generators, Airborne flowmeter system. For more information circle 216 on inquiry card.

POTTER INSTRUMENT COMPANY, Great Neck, L. I., New York 536-539
Exhibiting: New Products—Electronic counting, timing, control computing, recording and data handling equipment
For more information circle 217 on inquiry card.

PRODUCTION INSTRUMENT CO. (See General Controls Co.) 748
For more information circle 218 on inquiry card.

QUARIE CONTROLLERS, Canton, Mass. 325
Exhibiting: New Products—Process Characteristic Analyzer, scan output of a unit process with respect to five process inputs; Universal Servo Input Adapter, reference voltage and dial end point controls reading directly in millivolts. Regular Products—Optimal controller. For more information circle 219 on inquiry card.

REEVES SOUNDCRAFT CORP., New York 22, New York 341
Exhibiting: New Products—"Grimaco", grindable magnetic dispersion for use on magnetic drums and discs; "Magna-See", solution to make magnetic recordings visible. Regular Products—Magnetic recording tapes—type A data processing, type B telemetering. Professional audio application, magnetic films
For more information circle 220 on inquiry card.

RESCO, INC., Minneapolis 5, Minnesota 321
Exhibiting: New Products—Zero-Max Model 54, heavy duty infinitely variable speed reducer; Model M54, motorized variable speed reducer producing constant torque of 60 in. lbs.; Model M24 motorized variable speed reducer producing constant torque of 100 in. lbs. Regular Products—Zero-Max infinitely variable speed control units.
For more information circle 221 on inquiry card.

ROYAL MCBEE CORPORATION, Port Chester, New York 550-552-649-651
Exhibiting: New Products—Royal Precision LGP-30, single-address fixed point, binary, stored program automatic electronic computer.
For more information circle 222 on inquiry card.

SANDERS ASSOCIATES, INC., New Hampshire (Nashua) 532-541
Exhibiting: New Products—Electronic, Electro-Mechanical And Electro-Hydraulic Systems and Components
For more information circle 223 on inquiry card.

SCAM INSTRUMENT CO., (See Bragar) 426-428-430-432-434
Exhibiting: New Products—Annunciator Systems, for monitoring temperatures, pressures, and other possible abnormalities in industry. Regular Products—Annunciator alarm systems
For more information circle 224 on inquiry card.

SENSITIVE RESEARCH INSTRUMENT CO., New Rochelle, New York 413
For more information circle 225 on inquiry card.

SERVO SYSTEMS CO., Newark 12, New Jersey 931
Exhibiting: New Products—Servo-Kit, Servo-Speed/Torque-Unit. Precision Components, Pots, Synchros, Motors, etc.
For more information circle 226 on inquiry card.

SOLA ELECTRIC CO., Chicago 50, Illinois 825
Exhibiting: New Products—Constant Voltage Transformers; Regulated Electronic Power Transformers; Fixed and adjustable regulated DC Power Supplies; Adjustable Regulated AC & DC Voltage Supplies and related products
For more information circle 227 on inquiry card.

SOROBAN ENGINEERING, INC., Melbourne, Florida 924
Exhibiting: Regular Products—Data Input-Output Systems including the following—high speed paper tape perforators, paper tape readers, coding keyboards, automatic tabulators, verifying and comparator equipment
For more information circle 228 on inquiry card.

STANDARD INSTRUMENT CORPORATION, New York 12, New York 231
Exhibiting: New Products—Tally-Count Electronic Batch Counter, momentary or lock-in closure of contacts at any predetermined count from 1 to 9999. Tally-Print Print-Out Counter, production totals at predetermined intervals on time-indexed strip chart. Regular Products—Time recorder-totalizer, electronic rev-switch, load switch, time totalizer.
For more information circle 229 on inquiry card.

THE TECHNICON COMPANY, Chaucey, New York 946
Exhibiting: Technicon Autoanalyzer, perform complete chemical analysis automatically. Regular Products—Automatic Fraction Collector.
For more information circle 230 on inquiry card.

WEST INSTRUMENTS, Chicago 231
Exhibiting: Integrated plug-change units, millivolt extension scanning

WALDORF-AUTOMATION, New York 231
Exhibiting: Preset Mechanical Components
For more information circle 231 on inquiry card.

WARNER & SWASEY, New York 231
Exhibiting: Drills, all sizes; Mills, "Piranha" tape graph, automatic controls—Data—Drills, all sizes; Mills, "Piranha" tape graph, automatic controls—Data—

WANG LABORATORIES, Cambridge 231
Exhibiting: Calculators, Electronic Components
For more information circle 232 on inquiry card.

VANGUARD, New York 231
Exhibiting: Form. Reg. Production
For more information circle 233 on inquiry card.

WEEDER-FERTILIZER, New York 231
Exhibiting: Preset Mechanical Components
For more information circle 234 on inquiry card.

WALDORF-AUTOMATION, New York 231
Exhibiting: Drills, all sizes; Mills, "Piranha" tape graph, automatic controls—Data—Drills, all sizes; Mills, "Piranha" tape graph, automatic controls—Data—

WARNER & SWASEY, New York 231
Exhibiting: Drills, all sizes; Mills, "Piranha" tape graph, automatic controls—Data—Drills, all sizes; Mills, "Piranha" tape graph, automatic controls—Data—

WATERFORD, New York 231
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Exhibiting: Drills, all sizes; Mills, "Piranha" tape graph, automatic controls—Data—Drills, all sizes; Mills, "Piranha" tape graph, automatic controls—Data—

WATERFORD, New York 231
Exhibiting: Drills, all sizes; Mills, "Piranha" tape graph

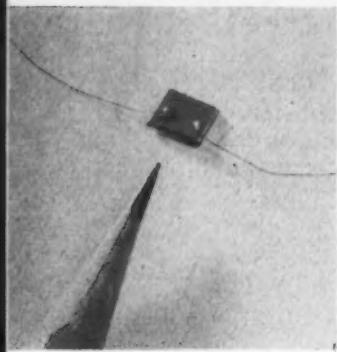


FIG. 1. TYPICAL Photosensitive Resistor.

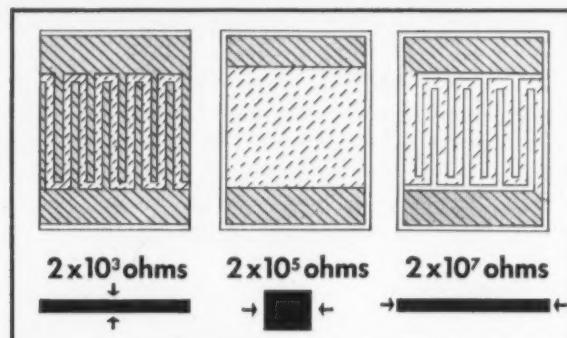


FIG. 2. PHOTOSENSITIVE resistances can be tailored to fit.

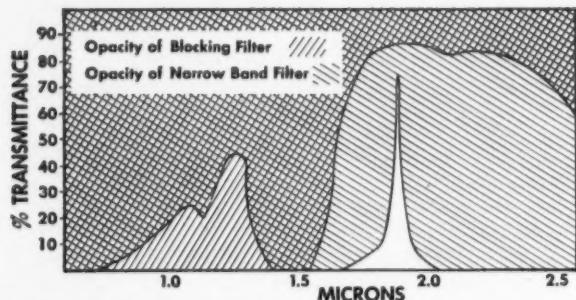


FIG. 3. NARROW BAND filter plus blocking filter provides transmittance-to-order.

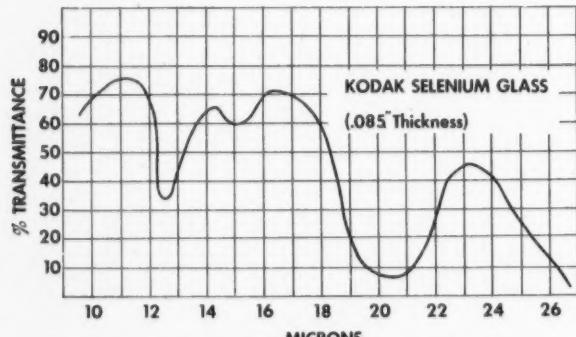


FIG. 4. TRANSMITTANCE of selenium glass.

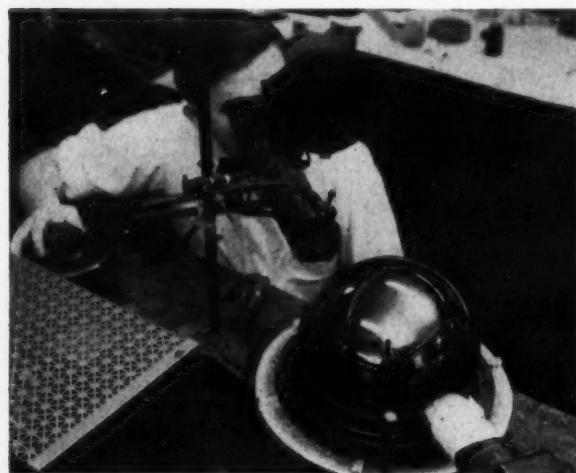


FIG. 5. SELENIUM GLASS has high index of refraction, is rugged and stable.

FIG. 6. FAR INFRARED filters are made by coating chloride with silver sulfide. A photograph of a person's hands working on a circular silver sulfide filter.



Materials for Infrared

Fordyce E. Tuttle

Apparatus & Optical Division
Eastman Kodak Company

FOUR RECENT developments in the infrared field of particular interest to military systems engineers are photosensitive resistors, IR interference filters, selenium glass, and far-IR filters.

Photosensitive Resistor

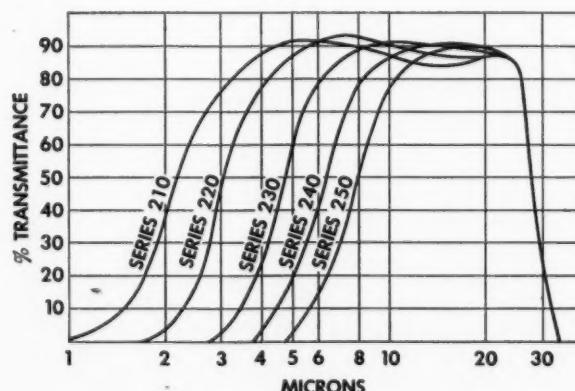
For missile instrumentation and sensing applications, there are unique advantages in the simplicity of the Ektron Detector, a photosensitive resistor (Fig. 1).

Normally formed on a 0.03"-thick glass blank, it consists of a rectangular deposit of lead sulfide with gold electrodes deposited at the edges of the sensitive area. Complex, exact arrays and mosaics (Fig. 2) of extremely small resistors can be produced, which are rugged and unaffected by vibration.

The useful photosensitivity of the detector ranges from 0.25 to 3.5 microns. Though the detector competes with phototubes and photomultipliers when exposed to tungsten light, it reaches maximum sensitivity at a wavelength of about 2 microns in the infrared region.

The Ektron Detector is also characterized by high signal-to-noise ratio, time constants in the range 400 to 1000 μ sec, dark resistance of 0.2 to 0.8 megohm for any square cell, and a negative thermal coefficient of resistance.

FIG. 7. CUTOFF CHARACTERISTICS, Far Infrared Filters.



Infrared Interference Filters

Blocking filters and narrow-band filters are made by vacuum deposition of alternate layers of high and low index materials of proper thickness on suitable substrates.

In a typical narrow-band filter the width of the spike at half-maximum (Fig. 3) is less than 2% of the nominal transmission wave-length value but it may be made somewhat broader if desired. Since these filters have windows on the short wavelength side, they are usually used in conjunction with suitable blocking filters. All filters are made to order for each application.

Selenium Glass

Selenium glass (Fig. 4) has a refractive index of 2.45 or higher, depending on the exact composition. Black by reflected visible light, it has a transmittance that is optically useful from 1 to 25 microns (Fig. 5). Unlike arsenic trisulfide, which is virtually opaque between 13 and 15 microns, this arsenic-cross-linked selenium glass incurs most of its transmission loss (except for absorption bands at 12.6 and 20.5 microns) from Fresnel reflection due to the high refractive index. On the other hand, this high index is extremely useful when infrared detectors are embedded in the glass in order to increase their geometrical radiation-collecting effectiveness.

The plano-convex, hemispherical lenses show no optical deterioration or change in power after 15 hours at 70°C. Domes or thin lenses show no optical deterioration or change in power after 15 hours at 65°C.

Far Infrared Filters

When optically polished, silver chloride (Fig. 6) becomes one of the most transparent of solids—out to 27 microns in the infrared. A far-infrared filter is the result of coating silver chloride with silver sulfide.

Spectral transmittance depends on how the silver sulfide is applied (Fig. 7). Filters can be supplied with specified spectral transmittance in any of none equally spaced short-wave-length cutoffs, from 1 to 5 microns. They are delivered within a tolerance of 0.2 micron.

For more information circle 333 on inquiry card.

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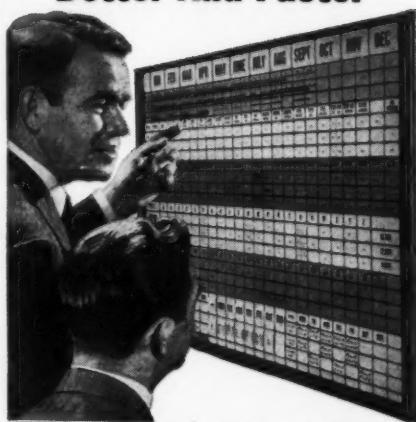
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March-April, 1958

Semiconductor "Thyatron"

The silicon controlled rectifier, a new semiconductor device combining the features of a rectifier and a transistor, now provides characteristics similar to the thyatron rectifier. The new device, a development of General Electric's Semiconductor Products Dept., is expected to have important applications in static switching, for dc-to-dc converters, for dc motor speed control, in regulated dc power supplies and other uses. Available at present only in sample quantities, prospective users are cautioned that preliminary published characteristics can now be used only as a guide because the devices are still undergoing development. G. E. expects that mass production will begin late this year.

The controlled rectifier is a PNPN semiconductor consisting of three rectifying junctions. Avalanche breakdown of the center junction can be achieved by applying an appropriate signal to a third lead (called the "gate") which consists of an ohmic contact to the center "P" region. Breakdown occurs in approximately 1 μ sec after which the voltage across the device is so very low that the current is essentially load-limited. Accordingly, a large anode to cathode current can be

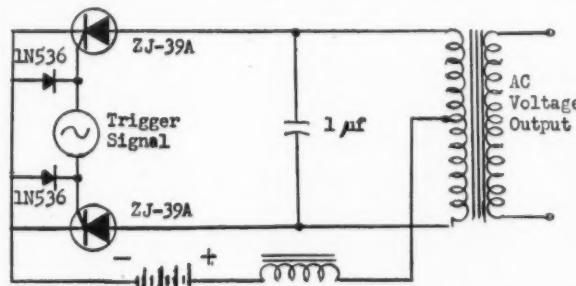


FIG. 1. SOLID-STATE Inverter Circuit.

controlled with an extremely small amount of gate electrode power, or power can be switched from a high to a low impedance in microseconds.

As in the thyatron, the "gate" loses control once the device is fired, and removal or reversal of the anode voltage is necessary to turn off the current. Unlike the thyatron, gate *current* rather than *voltage* determines the firing point of the controlled rectifier. Because the device does not include its own heat sink, it should be mounted on a cooling fin of the same proportions as a silicon rectifier of comparable power rating.

Figure 1 shows application of the controlled rectifier in a power inverter circuit for a mobile transmitter power supply. Other applications, including power flip-flops, half- and full-wave phase-controlled power supplies, surge voltage suppressors, dynamic braking and static switching circuits are shown in 9-page "Type ZJ-39A, Silicon Controlled Rectifier, Preliminary Specifications and Application Notes," (From Semiconductor Products Dept., General Electric Co., Syracuse, N. Y.)

For this literature circle 301 on inquiry card.

ENGINEER OPPORTUNITIES AT RAYTHEON



NEW C.A.A. RADAR being developed at Wayland Lab will be used in nationwide aircraft surveillance network. Features: video mapping converter, circular polarizer, complete system remote controls available at the console.

Wayland Laboratory's "dream" facilities and projects gain national reputation

Ask any development engineer who's visited Raytheon's Wayland Laboratory! He'll tell you it's one of the most modern labs for prototype development of electronic equipment and that Wayland projects are the most advanced in their respective fields.

There are four creative departments:

COMMUNICATIONS — scatter, radio relay, T.V. terminal and message circuit multiplex equipment.

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RADAR — pulse radar equipment including ground-based, airborne, long range search, air traffic control, weather and commercial marine.

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PLUS TWO OTHER DEPARTMENTS providing engineering services . . . environmental test, reliability and components engineering, engineering standards, production engineering, and technical writing.

For details, please contact Donald B. Stillman, Staff Assistant to Manager, Box 1M, Wayland Laboratory, Wayland, Mass.

RAYTHEON MANUFACTURING COMPANY
Wayland, Massachusetts

Are you the
ONE MAN IN THREE?

RAYTHEON

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WAYLAND LABORATORY

Vinyl Card Actuates Automatic Switch Component

Automatic programming for inspection, testing and production control is now available to small production and laboratory engineering setups through use of a new card-operated multiple switch. The component also can be incorporated in automatic devices manufactured for commercial sale.

First designed as a part of the Hickok Cardmatic Tube Tester (Page 40, Jan-Feb MILITARY AUTOMATION), the wider possibilities of the Cardmatic Automatic Multiple Switch as a separate component were soon apparent, resulting in a decision to market it as a systems component. It provides an unlimited number of possible switching combinations which have been calculated at 12.6×10^{56} .

The Cardmatic multiple switch is a self-actuating type mechanism built around 187 self-cleaning, wiping-type switches, which have survived life tests in which they operated over 100,000 times without failure. Its high current-carrying capacity (10 amps) and low contact-to-pin resistance (0.00025 ohms) made possible by its design invites its use wherever multiple switching of highly accurate test circuits or reli-

able control circuits is required while maximum flexibility of circuit arrangements is retained.

To operate the switch, a selected pre-punched card is inserted into the unit to operate a momentary control-solenoid trip-mechanism which actuates all desired contacts simultaneously. The tough vinyl code cards are prepunched on the basis that the absence of a hole provides a contact actuation. Since no contacts are established through the holes the card does not provide insulation, only physical separation of the contact actuating pins. To open all contacts and release the code card, a top lever cam is physically depressed to energize the spring-type actuating mechanism for the next multiple switching operation.

The availability of the Cardmatic Automatic Multiple Switch as an automation system component should remove a "hardware bottleneck" that has delayed the automation of many testing and operational routines in testing and research laboratories and in small-lot production lines, where the design and manufacture of a versatile multiple switching element is frequently the most complex problem.

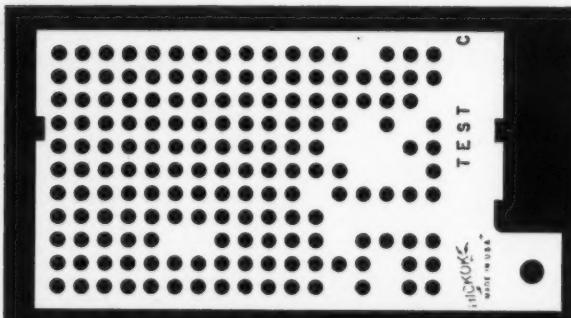
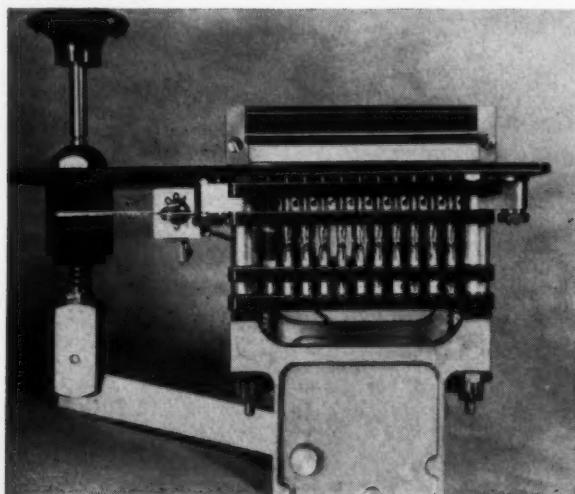


FIG. 1. ABSENCE OF HOLE in vinyl card causes contact. Switches opposite holes do not contact.

FIG. 2. 187 SEPARATE 10-AMP contacts operate selectively when card is inserted. Switch is released by push on knob.



For more information circle 302 on inquiry card.



FIG. 3. FOR MANUAL OPERATION, special card with all holes punched is inserted. Individual switches are operated by inserting plastic pins.

FIG. 4. SWITCH IS AVAILABLE for a wide range of uses.



Semiconductors Handle Man-sized Jobs

Most transistors, even those described as "power transistors," have outputs of less than 30 to 50 watts. Also, the ambient temperature ratings for most transistors are limited to those which are not uncomfortably warm for humans. The recent announcement by the Semiconductor Division of the Westinghouse Electric Co., Youngwood, Pa., that they are in pilot production on power transistors and diodes with outputs of 1 to 3 kw, adapted to 150°C ambients, merits consideration. Outputs in this range are made possible by combining silicon crystals of higher purity than heretofore available with new alloy systems and by using new fabrication techniques. Low forward resistance



FIG. 1. 3 KW TRINISTOR dwarfs standard transistor.

results in power efficiencies exceeding 99% and enables high power output with fewer heat sink problems than normally experienced in transistor applications. Small physical size and low heat loss permits hermetically sealed construction (Fig. 1) meeting Mil-Spec requirements for marine and other uses in extreme environmental conditions. Space and weight savings over magnetic amplifiers of 10- to 1, simpler design and greater reliability are said possible.

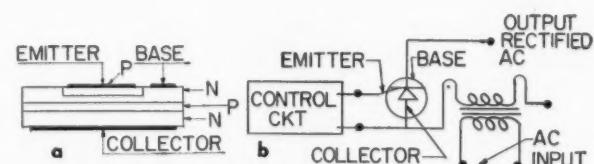


FIG. 2. (a) ARRANGEMENT of semiconductor elements in the trinistor. (b) Typical trinistor controlled-rectifier circuit.

The silicon trinistor triode is described as a three-terminal switching device which differs from a transistor in that its emitter and collector have opposite types of conductivity (Fig. 2a). Peak inverse voltages of several hundred volts may be achieved by control of the fabrication process.

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If a current from a source of approximately 1 v dc controlled by a variable resistor is passed through the control electrode to the base, the critical voltage will decrease for increasing values of control current until it is firing at about 6 v for a control current of approximately 10 ma. Once fired, the trinistor continues to carry forward current until the supply voltage is interrupted, or until a reverse current pulse is administered to the control electrode. This cut-off feature makes the trinistor considerably more versatile than the gas-tube thyratron, which can be cut off only by an interruption or reversal of supply power polarity.

The trinistor has an extremely fast reaction time of approximately 40 milli-microseconds, which lends it to pulsed-control applications such as sonar and radar drivers, and in high-frequency inverters.

A new high-temperature rectifier unit, using silicon carbide as the rectifying element was also demonstrated. If it is protected from sudden thermal shocks, continuous operation of this diode up to 700° C does not permanently damage the rectifier.

For more information circle 303 on inquiry card.

Analyzer Evaluates Lost Motion In Precision Gears



Lost motion in precision gear trains used in guided missiles, servos, computers, etc., can now be accurately evaluated using a new instrument consisting of an electronic control console and a two-phase torque actuator. The control unit supplies accurately measured voltage to the actuator, and a read-out dial on the actuator reads the precise angular displacement of the actuator shaft during the test. Thus, total lost motion is measured by applying constant torque to the input pinion of the locked gear train and reading clockwise and counter-clockwise actuator shaft displacement. The Daco Analyzer, designed by the Daco Inst. Co., Tillary & Prince Sts., Brooklyn 1, N. Y. also measures torque required to drive free-running gear boxes, facilitating adjustment and alignment during assembly, and provides a means of setting gear-train safety clutches.

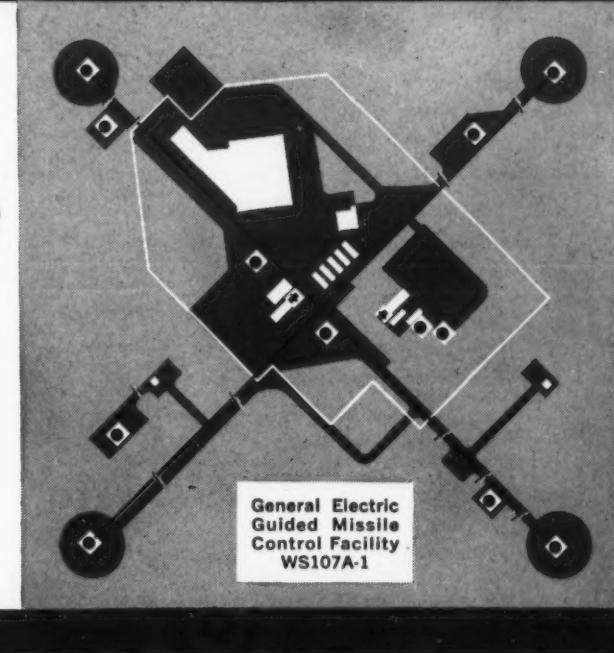
For more information circle 304 on inquiry card.

GRADUATE EE'S: GENERAL ELECTRIC DISCLOSES HIGH PRIORITY PROGRAM FOR ATLAS

GUIDANCE SYSTEM. MANY POSITIONS OPEN IN ELECTRONIC MISSILE TECHNIQUES

ACCURACIES ON ORDER OF 1 PART IN 10 MILLION

*required for portions of G.E.'s
ICBM ATLAS Guidance System*



Delivering an ICBM over a > 5000 mile trajectory into the target area demands a guidance system of unprecedented accuracy—and this is the calibre of the electronic system General Electric engineers are creating for ATLAS.

But achieving designated accuracies and reliabilities in the laboratory is not enough. *These high standards must be maintained in actual operational environments, with virtually no interruption or degradation.*

CAREERS IN STEP WITH THE FUTURE

Engineers who join the Missile Guidance Product Section of G.E. are doing more than hastening development of one of the nation's most urgent programs—guidance for ATLAS. As Manager of the Section Richard L. Shetler states: *"With this job behind us, there will remain no significant obstacle to the practical guidance and navigation of other space vehicles."*

PROGRAM ACCELERATION OPENS UP WIDE RANGE OF POSITIONS IN:

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Systems and component reliability
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IF-Video circuits
RF and Microwave components & plumbing
Communications control devices
Doppler radar design & development
Digital data processing techniques, data transmission involving D & D of ground-based & airborne antennae, transmitters, receivers; application of transducers, transponders, etc.
Test operations, including planning, range instrumentation & test execution; development & application of automatic test equipment

If you feel that your special skills and interests fit you to work in any of the above areas, why not write us in detail? Qualified candidates will be invited to visit our facilities to meet with technical managers and gain first hand knowledge of the living advantages of our locations at Syracuse and Utica, N. Y.

Write in complete confidence to Mr. E. A. Smith, Room 3-K

MISSILE GUIDANCE PRODUCT SECTION

GENERAL  **ELECTRIC**

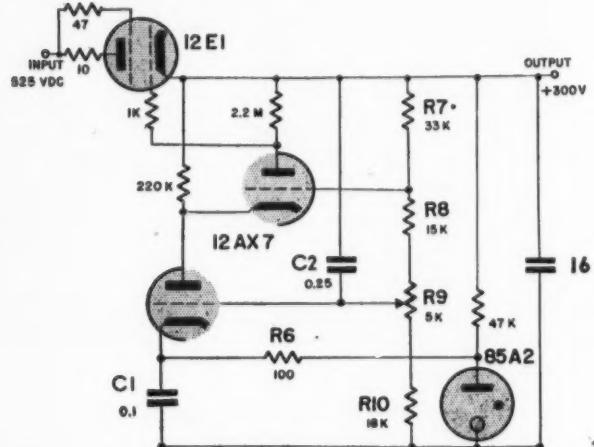
Court Street, Syracuse, N.Y.

Circuitry for Military Applications

Selected from 100 Electronic Circuits
by Aronson and Kezer, Insts. Pub. Co.

VOLTAGE REGULATOR WITH CASCODE AMPLIFIER

The high voltage gain of the accompanying modified cascode circuit makes it a natural for an improved degenerative-stabilizer (or voltage-regulator) circuit. Principle of operation is the same as the conventional regulator, with the cascode replacing the pentode amplifier tube (such as 6AU6) often used. Changes in the 300-v d-c output, resulting from line-voltage or load current changes, appear at the grid of the lower triode via the voltage divider across the



output. As the cathode voltage of this triode is held fixed by the gas regulator tube 85A2, grid voltage changes are amplified and applied to the grid of the series regulator tube. Polarity of the amplified voltage is such as to correct the original fluctuation, reducing it by a factor equal to the reciprocal of the circuit gain. Superiority of the cascode, with its voltage gain of over 1000, compared to a pentode gain of perhaps 100, is thus evident. Internal impedance and hum from the input are reduced by the same factor.

Capacitor C_1 decouples the lower cathode of the 12AX7, avoiding reduction in gain at high frequencies due to the impedance of the neon regulator. Resistor R_6 prevents relaxation oscillations between the 85A2 and C_1 . Capacitor C_2 improves performance by eliminating attenuation of the voltage divider at high frequencies. Output impedance is maintained low at frequencies above 2.5 kc (where the cascode gain begins to drop off) by the 16- μ F capacitor across the output. This drop in gain results from shunting of the high output resistance of the cascode by 32- μ F effective capacitance existing at the grid of the 12E1.

The 12E1 and 85A2 are British types, USA types may be used with minor modifications. Type 12E1 is roughly comparable to an 807; it passes 100 ma at a plate-cathode potential of 135 v with grid-cath-

ode voltage of -20. Transconductance at this operating point is 2800 micromhos. Type 85A2 is comparable to the VR 90; its voltage drop is 85 volts.

Careful layout is needed to achieve low hum and noise; voltage-adjusting potentiometer R_9 should be mounted close to the grid pin of the 12AX7.

Voltage regulation: ± 0.4 v for $\pm 10\%$ change in line voltage.

Output impedance: 0.5 ohm at dc, decreasing to 0.2 ohm at frequencies up to 50 kc; this compares with 2 ohms for usual pentode stabilizer.

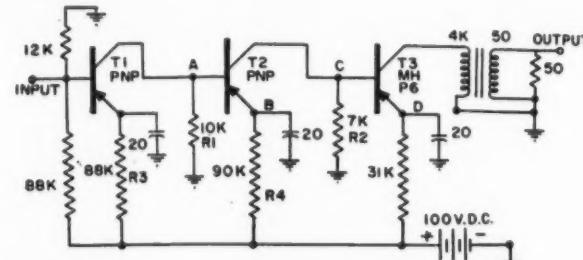
Input: 525 v dc. Output: 300 v dc; 150 ma.

Hum and noise: May be held to 100-200 μ v at output with careful layout; value depends more on stray pickup than hum on input side (which is 2.5 v).

Source: Prof. V. H. Attree, College of Technology, Manchester, Eng.

DIRECT-COUPLED TRANSISTOR AMPLIFIER

This direct-coupled transistor servo amplifier uses fewer components than transformer or capacitor-coupled amplifiers, but requires a higher power-supply voltage to maintain practical collector-to-emitter dc voltages.



In a direct-coupled transistor amplifier, the collector-to-ground direct voltage of one stage is the base-bias voltage of the following stage, and is approximately equal to the emitter voltage of that stage. It is desirable for good bias stabilization for the series emitter resistors (R_3 and R_4) to be about 10 times the corresponding collector circuit resistances. With a 28 v d-c supply, only about 2.5 v dc would thus be available to be dropped across T_2 and R_2 , which is impractical.

Interchanging ten transistors of three different makes in the first two stages produced a spread in over-all power gain of only 10%. Feedback could be used to decrease this spread at the expense of power gain.

Power Gain: 92 db at 65° C; 85 db at -60° C; and 87 db at 80° C.

Impedances: Source, 10 ohms; load, 50 ohms; input, 1600 ohms.

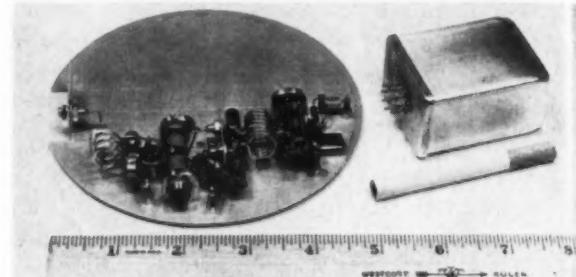
Freq. response: Down 3 db at 200 cps and 20 kc.

Phase shift at 400 cps: -78° .

Source: A. N. De Sautels, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Satellites To Sing Longer

All information gathered by a test satellite must be transmitted back to earth by radio. The reliability and efficiency of this tiny transmitter, with its power supply, is consequently of greatest importance. The development of a new 500 milliwatt 108 mc transmitter,

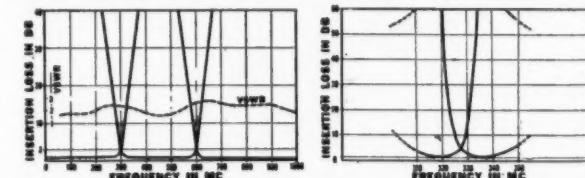


weighing only 3 oz and capable of transmitting 1 1/2 to 4 times as long on the same battery power as former tele-emitters, is a significant breakthrough. It uses new Western Electric transistors capable of efficient operation as oscillators at 108 mc, for which tubes are now used. If operated on solar batteries, it can transmit indefinitely, but uses one-half or less of the satellite heretofore required for sun exposure. Because less space and less weight is needed for batteries and transmitter, more "pay-load" in sensing instrumentation can be carried in each satellite. Developed for the Naval Research Laboratory by the DuKane Corporation, St. Charles, Ill., its designers emphasize that additional development will be required before it is programmed into an actual satellite.

For more information circle 305 on inquiry card.

RF Filters

UHF, VHF, and L-Bands may be divided into three channels with 40 db isolation with new Triplexer which makes the whole frequency spectrum usable



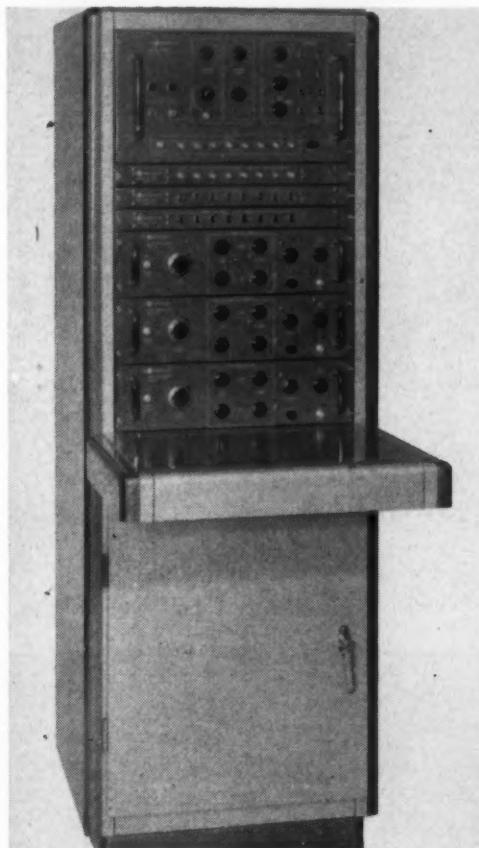
because power is divided equally at the crossovers with negligible loss. The max VSWR in the entire range is below 2.6:1. Weight is 14 oz, but with a slight sacrifice in size, 60 db isolation between the channels can be provided (Fig. 1). Choice of connectors is optional.

Designed to isolate two adjacent channels 5% apart, a Telemetering Diplexer has isolation minimum of 60 db, and insertion loss in the pass band under 1.0 db. Ruggedized and temperature compensated down to -70° C with no appreciable drift in performance, this type of filter is suitable for high-altitude airborne and missile applications (Fig. 2). Units may be specially designed to fit into compact assemblies. (From 8-page brochure, "R. F. Filters" by Microphase Corp. Box 1166 Greenwich, Conn.)

For this literature circle 306 on inquiry card.

Programmed Magnetic Core Tester

New Magnetic Core Tester features precisely controlled, fully programmed, high amplitude current pulses for laboratory analysis and production testing of a wide range of magnetic materials and components. Its modular construction permits changes to accommodate expanding test requirements. Designated the Rese Model 1100, it incorporates versatile program generator, stabilized power supplies and three advanced design current drivers operating from ground level.



Two drivers deliver negative pulses up to 2 amps and the positive driver delivers pulses to 3 amps, providing maximum utility in single turn testing of magnetic cores. With a high source impedance, the current drivers have a dynamic range in excess of 250 v for accurate testing and analysis of large tape wound cores and other highly reactive loads. Rise time is controllable, from 2 to less than 0.10 μ s with pulse widths as short as 0.50 μ s. Exponential fall time is continuously variable from 0.15 to 1 μ s.

The Model 1100 system is built around a program generator which develops a basic, 8-step, periodically repeated pattern. The repeat feature is particularly valuable for the study of circuit PRF sensitivity, duty-factor effects, core demagnetization, minor hysteresis loop analysis and other applications requiring unusual pulse programming. The Model 1100 magnetic core tester is a development of Rese Engineering, Inc., 731 Arch St., Philadelphia 6, Pa.

For more information circle 307 on inquiry card.

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Electronic Circuitry for Instruments and Equipment

by M. H. Aronson. "Comprehensive source book on instrument circuitry," this complete home-study text includes 458 multiple-choice questions (and answers), 215 illustrations, 10 tables, comprehensive index. Paperbound, 324 pages, 1957 (revised edition).

Handbook of Measurement and Control

Editor M. F. Behar and 12 other eminent authorities present classifications, operating factors, and typical applications of all basic methods and mechanisms, including pneumatic, hydraulic, electric, and electronic instruments. Clothbound, illustrated, 308 pages, 1951.

Printed Circuitry

by Allan Lytel. A valuable working tool; includes alternative and recommended practice for each step in design and production of printed circuits; a buyer's guide to special components; and "how to" service data. Paperbound, illustrated, 192 pages, 1957.

Maintenance and Servicing of Electrical Instruments

by James Spencer. Useful to all instrument users, service men, switchboard attendants, testing engineers, and others, this book covers construction, testing, applications, principles of operation and maintenance of all kinds of electrical indicating instruments. Clothbound, 274 illustrations, 280 pages, 1951 (third edition).

Heat Inertia Problems of Automatic Control of Temperature

by Victor Broida. A new treatment, based on the concept of the "fictitious mass" of the heat-process unit under automatic control . . . "can be mastered by anyone who has taken first-year differential equations." Paperbound, 64 pages, 1950.

Applications of Industrial pH Controls

by A. L. Chaplin. "pH is a concentration variable which responds to and is a measure of the effects of a chemical reaction . . . and follows a non-linear control relationship" presenting unique problems in pH control application. Clothbound, 144 pages, 1950.

The Computer Handbook

edited by M. H. Aronson. A clear introduction to the entire field of electronic computers and data processors. Presentations by computer manufacturers at the Second Computer Clinic. Paperbound, 72 pages, 1956.

Process Control Analysis

by M. H. LaJoy and E. A. Baillif. An essential first step in analysis of closed-loop controlled processes via frequency response of the system. Clothbound, 72 pages, 1956.

Process Control

by A. J. Young. A "must" for all who have to do with the automatic control of industrial processes, this book combines for the first time the practical "how" and the theoretical "why". Paperbound, 134 pages, 1957 (second printing).

Operation and Care of Circular-Scale Instruments

by James Spencer. Includes "trouble" charts for d-c, and for a-c instruments; covers d-c instruments, a-c ammeters and voltmeters, wattmeters, frequency meters, power factor meters and synchroscopes. Clothbound, 90 pages, 1949.

Control Valves

by C. S. Beard. New "one-book" reference on control valves . . . covers flow characteristics; mechanical features; valve capacity; sizing; body types; positioners; actuators, including d-c, electrohydraulic and gas hydraulic actuators. Numerous tables and illustrations. Paperbound, 236 pages, 1957.

Normal Shields Raise Tube Temperatures New Shield and Inserts Extend Tube Life

Studies by the Naval Electronics Laboratory in tube cooling have shown three principal thermal barriers in the JAN S-28 tube shield (Fig. 1) which tend to increase tube temperatures above the danger point, contributing to a high failure rate: (1) tube-shield air space, (2) poor thermal contact between shield and socket, and (3) poor contact between socket and chassis. NEL proposed a corrugated tube-shield liner which was effective in reducing tube temperatures by 50°C or more. New Atlas Full-Contact inserts (Fig. 2) now provide contact with up to 98% of tube envelope virtually eliminating the tube-shield airspace effect.

For more information circle 308 on inquiry card.

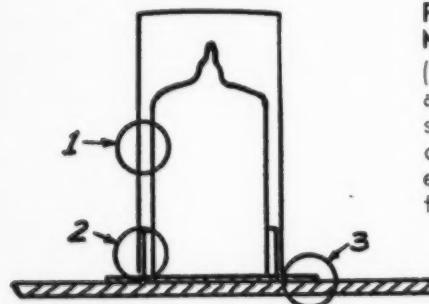


FIG. 1. THERMAL BARRIERS:
(1) Tube-shield airspace; (2) shield-socket contact; (3) socket-chassis contact.

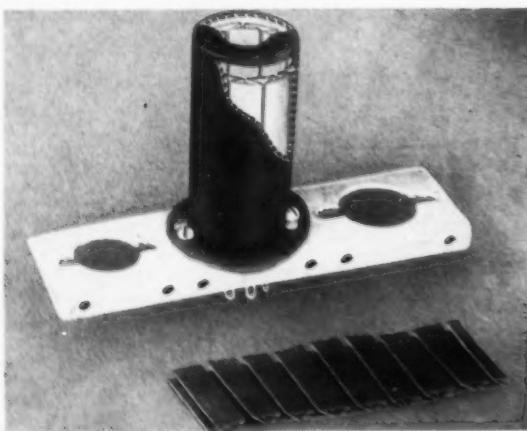


FIG. 2. FULL-CONTACT Inserts eliminate tube-shield airspace. One-Piece Shield eliminates tube-socket joint, is black to increase heat radiation.

and if used with Atlas One-Piece Tube Shields, bypass the tubesocket by making close thermal contact directly with the heat sink. Envelope temperatures more than 100°C cooler than those under JAN S-28 shields are consistently achieved.

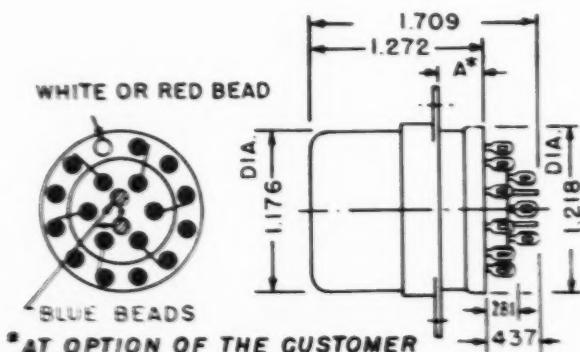
The new inserts are available for use with existing shields and equipment or are furnished as a part of the Atlas One-Piece Shield for new design applications

to achieve the maximum cooling effect. This shield, made of 0.010" aluminum for light weight and high heat conductivity, has its internal surface blackened to prevent reflection of radiant energy back to the tube. The insert, of black cadmium-plated beryllium copper, gives soft cushioning against vibration and shock. The shield-base surface is ground flat for best thermal contact with the chassis heat sink. Full-Contact Tube Shield Inserts and Atlas One-Piece Tube Shields are developments of the Atlas E-E Corporation, 47 Prospect St., Woburn, Mass.

For more information circle 308 on inquiry card.

Hi-Temp Relay Design

The use of "getters" in sealed relays is an original RCA development. These are absorbers which pick up organic vapors, either residual in sealing or later created by decomposition of oils, insulation materials,



etc. Organic vapors in relays accelerate contact erosion and cause carbonaceous deposits which rapidly increase contact resistance, but also reduce insulation resistance. The higher the temperature, the greater the accumulation of destructive vapors.

"Getters" are used in all RCA high temperature relays, and tests show that RCA relay contact resistance is lower after a "life test" at high temperatures than before. They are also used in low temperature units where contacts must be kept very clean for extremely low-level circuits. Another feature of RCA high temperature relays is the added protection resulting from Teflon splatter shields covering the glass beads inside the relay. These protect the beads from amorphous metal deposits which are inherent with contacts switch-

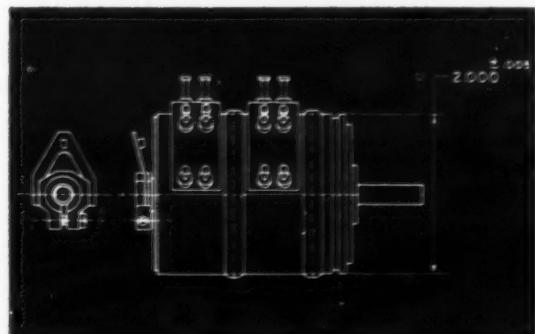
ing currents in the order of two amps. Such deposits are caused by arcing and accompanying erosion of the contacts at high temperatures in hermetically sealed relays. Unless guarded against they decrease the insulation resistance of the glass beads and in some cases actually short the contacts to the case. With Teflon splatter shields these relays maintain a minimum resistance of at least 10,000 megohms after "life test" between each contact and the case.

All RCA submini relays, 2, 4, and 6 pole units, meet MIL-5757 A, B, C, and MIL-R-25018 (USAF).—(From new 12-page brochure "RCA Subminiature Relays", Radio Corporation of America, Building 15-1, Camden 2, N. J.)

For this literature circle 309 on inquiry card.

2" Precision Pot

Modular design, which achieves flexibility in stacking, is featured in the Model 200-CEUS precision potentiometer which can be furnished with 13 pre-set taps, or can be tapped in the field by the user. Spacing of terminals facilitates direct attachment of padding resistors as desired to produce non-linear functions from stock items. Alternatively, non-linear units can be wound to any specified function. The precision machined housing allows stacking of as many as 15 units without loss of accuracy due to de-centering. Non-ferrous parts are anodized or plated; shaft and ball bearings are



stainless steel. Coin silver shorting strips may be installed in the field. Specifications:

Total Resistance (Max.)	200K
Total Resistance Tolerance Standard/Min.	5%/0.5%
Best Resolution	1/3300
Standard Electrical Angle	320° ± 1°
Max. Continuity Angle	340°
Linearity: Standard/Special	0.35%/0.15%
Conformity (For most functions)	1%
Number of additional taps available	13
Dissipation @ 40°C	5.0 watts
@ 85°C	3.0 watts

(From 26-page catalog, George Rattray & Co., 116-08 Myrtle Ave., Richmond Hill 18, N. Y.)

For this literature circle 310 on inquiry card.

ITV Eyes Hazardous Missile Test

The Rocketdyne Division of North American Aviation is using a rugged closed-circuit TV system for close observation of static firings in its propulsion



field laboratory. Zoomar lenses and remote control servos enable engineers to pan, tilt, focus and adjust lens iris from concrete recording centers hundreds of yards from the test stands. Reception is excellent, permitting visual checks of fuel and hydraulic system leaks. The Kin Tel Model ARM-14R 14" video monitor containing remote control panel for adjusting the Model ARC-8A Auto-Zoom lens is shown. This system, including some 20 cameras, was developed by Kin Tel, a division of Cohu Electronics, Inc., Box 623, San Diego 12, Calif.

For more information circle 311 on inquiry card.

Why Engineered Mountings?

Guided missiles, rockets and jet aircraft of this space age are propelled by enormously powerful engines at tremendous speeds. Engine unbalances and aerodynamic flutters produce severe high-frequency mechanical vibrations which are transmitted throughout the airframe.

These vibrations are detrimental to the aircraft's many sensitive electronic, electro-mechanical, and optical instruments. Service reports and laboratory tests reveal that many types of damage and malfunction are traceable to vibration. In addition, but short of total failure, are the less tangible effects of reduced efficiency and impaired performance. It has been determined that the effects of vibration are high on the list of causes of weapons systems failure. It follows that effective vibration isolation assures increased reliability and greater combat potential. . . . The ever-increasing performance requirements of air-borne systems increasingly demand the ultimate characteristics obtainable only with Federal engineered mounting systems.—(From 4-page applications bulletin No. FIA, Federal Shock Mount Corp., 1060 Washington Ave., New York 56, N. Y.)

For this literature circle 312 on inquiry card.



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To our Readers:

MILITARY AUTOMATION is a bi-monthly publication, which first appeared in February, 1957. It has served the designers, engineers, executives, and others in the manufacturing industries and officers in the defense services.

That it has fulfilled its objectives is confirmed by quotations from readers of the first six issues of **MILITARY AUTOMATION**, and by the large number of inquiries received for the various products advertised, and listed in the New Product and Manufacturers Literature Sections: 65200 sales leads for these products in the first five issues were forwarded to the manufacturer producing these products. Seldom does a publication accomplish its purposes in such a short time.

The increased emphasis on our defense activities in the months to come, will bring about a rapid uprising in business in the third quarter of 1958. Therefore you will want to place your advertising message before the Armed Forces and the manufacturers of the end products for the Armed Forces.

You are invited to place your sales messages in the bi-monthly issues of **MILITARY AUTOMATION**. Our district offices will be pleased to furnish you with any information you will require to arrange an advertising schedule in **MILITARY AUTOMATION**.

Boston	Andover 2212	New York	Murrayhill 8-0980
Chicago	Central 6-8963	Philadelphia	Evergreen 2-3878
Dallas	Riverside 7-0189	Pittsburgh	Fairfax 1-0161
Kansas City, Mo.	Baltimore 7305	St. Louis	Chestnut 1-1965
Los Angeles	Dunkirk 7-6149	San Francisco	Douglas 2-9183

Sincerely yours,
MILITARY AUTOMATION

Richard Rimbach

Publisher

P. S. Engineers with companies in this field are requested to call the attention of their Sales Promotion Director, to the value of being represented in the advertising columns of **MILITARY AUTOMATION**.

What You've Said About M-A . . .

"**MILITARY AUTOMATION** contains information with regard to new techniques and new components which will be useful to me."—Research Engineer, Advanced Systems Development Section, Arma Div., American Bosch Arma Corporation.

"After reading the March-April issue of **MILITARY AUTOMATION** I was happy to see a magazine devoted to military products."—Electrical Designer, Westinghouse Electric Corp., Project "A".

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"A copy of **MILITARY AUTOMATION** passed over my desk today and I would like a subscription very much."—Director of Operations for Engineering for Defense Products, American Machine & Foundry Company.

"During the past few weeks, my attention has been focused a number of times on **MILITARY AUTOMATION**. As my duties are directly concerned with testing components used in Military Products Systems, your magazine would provide me with valuable reference material."—Engineer, Military Products, International Business Machines Corp.

"**MILITARY AUTOMATION** has been found to be directly applicable to this company's missile system ground support equipment engineering and development."—Engineer, Ground Systems Control & Checkout Section, The Martin Company.

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"You are to be complimented on the commendable job you are doing in such a vital field. Our technical library serves an organization of 6,000 people engaged in the research and development of atomic weapons."—Librarian, Sandia Corporation.

"I have just finished reading the article Modern Digital Techniques in **MILITARY AUTOMATION**. The presentation of the ideas is very clear."—Manager, Circuit Development Section, Technical Products Div., Allen B. DuMont Labs., Inc.

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"The information in **MILITARY AUTOMATION** will be valuable to us in devising new electronic systems to solve problems for the Armed Services."—Supervisory Engr., Electronics Proposals, The Martin Company.

"Thank you for your foresight in producing this timely and helpful publication."—Machine Designer, Convair.

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"I have just read the July-August issue of **MILITARY AUTOMATION** and I liked it very much."—Government Field Engineer, Tube Div., Radio Corporation of America.

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Contact our district office
nearest you, or write direct to
Military Automation
c/o Instruments Publishing Co.
845 Ridge Avenue
Pittsburgh 12, Pa.
Phone FAirfax 1-0161**

Normal Shields Raise Tube Temperatures

New Shield and Inserts Extend Tube Life

Studies by the Naval Electronics Laboratory in tube cooling have shown three principal thermal barriers in the JAN S-28 tube shield (Fig. 1) which tend to increase tube temperatures above the danger point, contributing to a high failure rate: (1) tube-shield air space, (2) poor thermal contact between shield and socket, and (3) poor contact between socket and chassis. NEL proposed a corrugated tube-shield liner which was effective in reducing tube temperatures by 50°C or more. New Atlas Full-Contact inserts (Fig. 2) now provide contact with up to 98% of tube envelope virtually eliminating the tube-shield airspace effect,

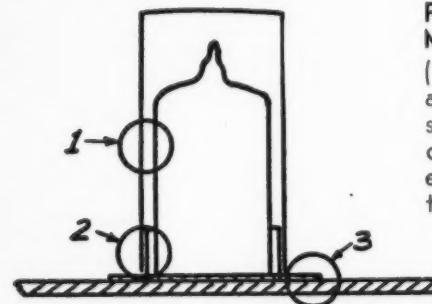


FIG. 1. THERMAL BARRIERS:
(1) Tube-shield airspace; (2) shield-socket contact; (3) socket-chassis contact.

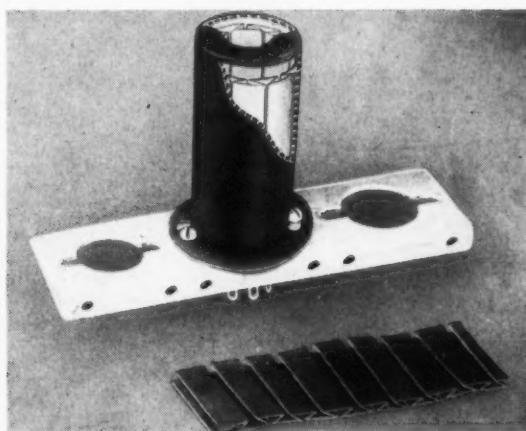


FIG. 2. FULL-CONTACT Inserts eliminate tube-shield airspace. One-Piece Shield eliminates tube-socket joint, is black to increase heat radiation.

and if used with Atlas One-Piece Tube Shields, bypass the tubesocket by making close thermal contact directly with the heat sink. Envelope temperatures more than 100°C cooler than those under JAN S-28 shields are consistently achieved.

The new inserts are available for use with existing shields and equipment or are furnished as a part of the Atlas One-Piece Shield for new design applications

to achieve the maximum cooling effect. This shield, made of 0.010" aluminum for light weight and high heat conductivity, has its internal surface blackened to prevent reflection of radiant energy back to the tube. The insert, of black cadmium-plated beryllium copper, gives soft cushioning against vibration and shock. The shield-base surface is ground flat for best thermal contact with the chassis heat sink. Full-Contact Tube Shield Inserts and Atlas One-Piece Tube Shields are developments of the Atlas E-E Corporation, 47 Prospect St., Woburn, Mass.

For more information circle 308 on inquiry card.

ing currents in the order of two amps. Such deposits are caused by arcing and accompanying erosion of the contacts at high temperatures in hermetically sealed relays. Unless guarded against they decrease the insulation resistance of the glass beads and in some cases actually short the contacts to the case. With Teflon splatter shields these relays maintain a minimum resistance of at least 10,000 megohms after "life test" between each contact and the case.

All RCA submini relays, 2, 4, and 6 pole units, meet MIL-5757 A, B, C, and MIL-R-25018 (USAF).—*(From new 12-page brochure "RCA Subminiature Relays", Radio Corporation of America, Building 15-1, Camden 2, N. J.)*

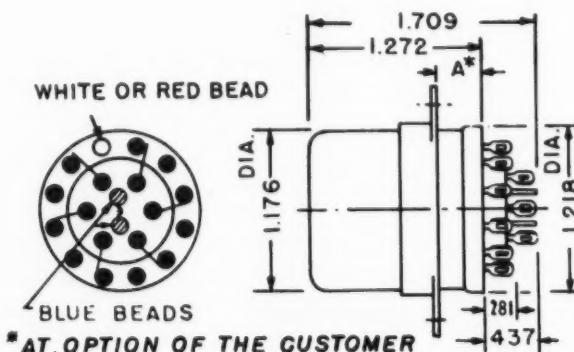
For this literature circle 309 on inquiry card.

2" Precision Pot

Modular design, which achieves flexibility in stacking, is featured in the Model 200-CEUS precision potentiometer which can be furnished with 13 pre-set taps, or can be tapped in the field by the user. Spacing of terminals facilitates direct attachment of padding resistors as desired to produce non-linear functions from stock items. Alternatively, non-linear units can be wound to any specified function. The precision machined housing allows stacking of as many as 15 units without loss of accuracy due to de-centering. Non-ferrous parts are anodized or plated; shaft and ball bearings are

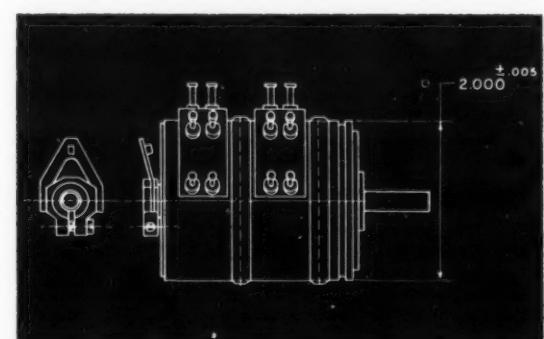
Hi-Temp Relay Design

The use of "getters" in sealed relays is an original RCA development. These are absorbers which pick up organic vapors, either residual in sealing or later created by decomposition of oils, insulation materials,



etc. Organic vapors in relays accelerate contact erosion and cause carbonaceous deposits which rapidly increase contact resistance, but also reduce insulation resistance. The higher the temperature, the greater the accumulation of destructive vapors.

"Getters" are used in all RCA high temperature relays, and tests show that RCA relay contact resistance is lower after a "life test" at high temperatures than before. They are also used in low temperature units where contacts must be kept very clean for extremely low-level circuits. Another feature of RCA high temperature relays is the added protection resulting from Teflon splatter shields covering the glass beads inside the relay. These protect the beads from amorphous metal deposits which are inherent with contacts switch-



stainless steel. Coin silver shorting strips may be installed in the field. Specifications:

Total Resistance (Max.)	200K
Total Resistance Tolerance Standard/Min.	5%/0.5%
Best Resolution	1/3300
Standard Electrical Angle	320° ± 1°
Max. Continuity Angle	340°
Linearity: Standard/Special	0.35%/0.15%
Conformity (For most functions)	1%
Number of additional taps available	13
Dissipation @ 40°C	5.0 watts
@ 85°C	3.0 watts

(From 26-page catalog, George Rattray & Co., 116-08 Myrtle Ave., Richmond Hill 18, N. Y.)

For this literature circle 310 on inquiry card.

ITV Eyes Hazardous Missile Test

The Rocketdyne Division of North American Aviation is using a rugged closed-circuit TV system for close observation of static firings in its propulsion



field laboratory. Zoomar lenses and remote control servos enable engineers to pan, tilt, focus and adjust lens iris from concrete recording centers hundreds of yards from the test stands. Reception is excellent, permitting visual checks of fuel and hydraulic system leaks. The Kin Tel Model ARM-14R 14" video monitor containing remote control panel for adjusting the Model ARC-8A Auto-Zoom lens is shown. This system, including some 20 cameras, was developed by Kin Tel, a division of Cohu Electronics, Inc., Box 623, San Diego 12, Calif.

For more information circle 311 on inquiry card.

Why Engineered Mountings?

Guided missiles, rockets and jet aircraft of this space age are propelled by enormously powerful engines at tremendous speeds. Engine unbalances and aerodynamic flutters produce severe high-frequency mechanical vibrations which are transmitted throughout the airframe.

These vibrations are detrimental to the aircraft's many sensitive electronic, electro-mechanical, and optical instruments. Service reports and laboratory tests reveal that many types of damage and malfunction are traceable to vibration. In addition, but short of total failure, are the less tangible effects of reduced efficiency and impaired performance. It has been determined that the effects of vibration are high on the list of causes of weapons systems failure. It follows that effective vibration isolation assures increased reliability and greater combat potential. . . . The ever-increasing performance requirements of air-borne systems increasingly demand the ultimate characteristics obtainable only with Federal engineered mounting systems.—(From 4-page applications bulletin No. FIA, Federal Shock Mount Corp., 1060 Washington Ave., New York 56, N. Y.)

For this literature circle 312 on inquiry card.

March-April, 1958



*military
automation*

PUBLISHED BY
INSTRUMENTS
PUBLISHING
COMPANY

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Los Angeles	Dunkirk 7-6149	San Francisco	Douglas 2-9183

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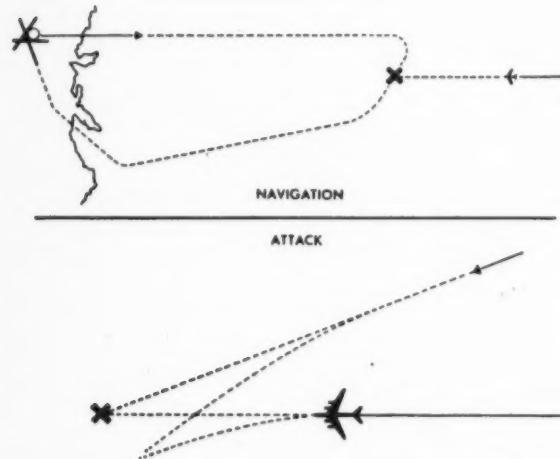
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Military Automation
c/o Instruments Publishing Co.
845 Ridge Avenue
Pittsburgh 12, Pa.
Phone FAirfax 1-0161**

Airborne Computer Development

A computer has been developed to automatically control the routine functions of navigation, search, attack and flight, leaving the pilot free to make important tactical decisions necessary to complete interceptor missions. Air data processing, guidance to the target, fire control and armament preparation, speed-altitude scheduling, and communication control are all accurately coordinated and governed by the Hughes DIGITAIR.

Before take-off the DIGITAIR automatically tests vital operations of the airborne system. A panel se-



lector snapped through a number of positions indicates in the computer whether the system is ready to carry out its mission. After take-off, when switched to automatic navigation, the computer determines the shortest time, with a minimum of fuel consumption, to the target. Compensating for wind velocity, either by dead reckoning or in conjunction with a ground beacon, it computes proper speed and altitude, decodes data from ground stations, displays information to the pilot on a cockpit radar scope, and sends steering-signal instructions directly to the aircraft's automatic flight-control system.

During attack the computer establishes a "lead-collision" attack course. The radar is locked on target, the computer automatically fires armament with accuracy, and automatically signals the pilot to break off the attack. After pull-out it flies the aircraft back to base.

The memory drum has storage capacity of 3896 19-digit words; 3008 permanently stored orders; its 48 operations include 8 arithmetic operations, 36 transfers, and 4 logical choice operations. Computer volume is approximately 4 cu ft; weight 120 lbs. (From 4-page "DIGITAIR" brochure #5, System Development Labs., Hughes Aircraft Co., Culver City, Calif.)

For this literature circle 313 on inquiry card.

Digitizing System Uses Digital-output Transducers

The California Institute of Technology Wind Tunnel has adopted a new system for obtaining force and moment test data in direct digital form. It employs nine Vibrotron Digital transducers and matched amplifiers to sense and signal hydraulic pressure variations from Emery Load Sensing Capsules directly attached to the test platform. Drag, lift and crosswind forces and pitch, yaw and roll moments are computed by the data digitizing equipment, consisting of digital gating and counting circuits and relay control circuitry. A system signal commutator sequentially samples Vibrotron transducer signals controlling operation of the data digitizing system to perform digitizing, totaling and subtraction of forces and moments. Heart of the test system are nine Vibrotron Transducers each basically consisting of a fine hair-sized wire stretched between an anchor point and a metal diaphragm. The wire is set into vibration in a permanent magnetic field by an alternating current along the wire; wire length and tension determine the vibrating frequency. Wire tension change decreases or increases transducer vibrating frequency, delivering a direct-digital output signal readable as a numerical indication. Repeatability and resolution of the system from applied pressure to digital output is equal to or greater than 0.05% of full scale. Digital outputs are stored in six relay bank registers for compatible use with summary punch and lamp bank display.

The system is operated by California Institute of Technology for 5 major aircraft companies and was developed by BJ Electronics, Borg Warner Corp., 3300 Newport Blvd., Santa Ana, Calif.

DIRECT GENERATION of digital test data by new digital transducers eliminates customary conversion circuits, achieves high resolution and repeatability.

For more information circle 314 on inquiry card.

Germanium Alloy-Junction Transistor Data Available

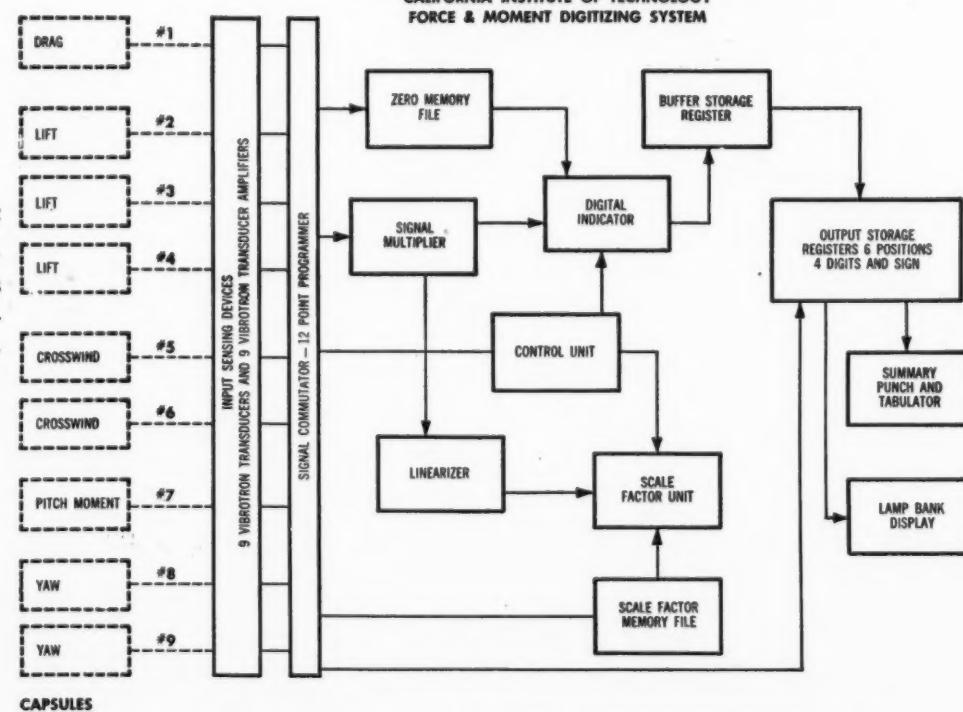
PNP germanium alloy-junction transistors manufactured to the strictest specifications include over 140 different types. Strict quality controls insure 100% testing and inspection. JETEC #30 case is used on all transistors for a permanently welded hermetic seal. Interchangeability listings are to be used as a guide only, as there may be some slight physical or electrical differences between those types which are only similar, rather than identical. NPN germanium-alloy-junction types will be available late in 1958.

INDUSTRO TRANSISTOR TYPE	MAX. RATINGS @ 25° C		Germanium Alloy-Junction Transistor Specifications						Application
	VCE Max. (Volts)	Dissipation Coefficient °C/mw	In Air °C/mw	With Ht. Sink °C/mw	hFE @ 270 Cycles	hFE @ 1mc	CC (μA)	ICBO (μA)	
TR-10	— 50	0.36	0.15	22		35	25 @ 50 V		Slow Speed Switching
TR-19	— 25	0.36	0.15	80	1.5	35	6		Slow Speed Switching
TR-761	— 10	0.4	0.18	75	10	14	1		G.P. High Frequency
TR-762	— 10	0.4	0.18	100	20	14	1		G.P. High Frequency
2N316	— 10	0.4	0.18			12	14	1	High Speed Switching
2N481	— 12	0.4	0.18			2.5	12	2	Radio OSC
2N482	— 12	0.4	0.18				12	2	Radio I.F.

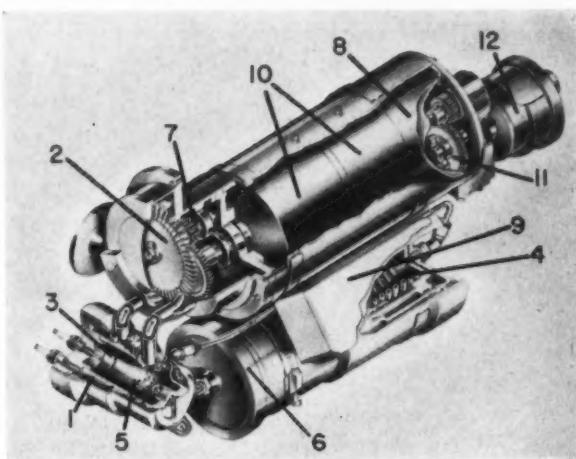
(From 4-page Specifications Table and Interchangeability Guide, listing specifications on over 40 Industro PNP Germanium Alloy-Junction Transistors. Interchangeability guide covers types by all manufacturers. Industro Transistor Corp., 35-10 36 Ave., Long Island City 6, N. Y.)

For this literature circle 315 on inquiry card.

SOUTHERN CALIFORNIA COOPERATIVE WIND TUNNEL CALIFORNIA INSTITUTE OF TECHNOLOGY FORCE & MOMENT DIGITIZING SYSTEM



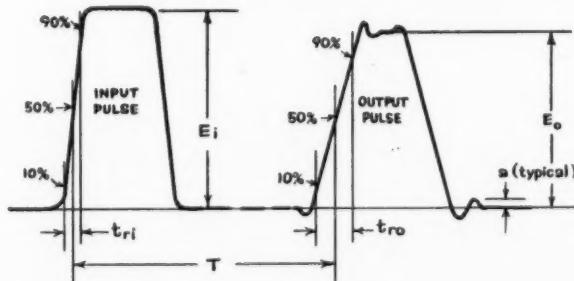
Monofuels Drive Power Unit



Electric power, hydraulic power, or both are provided in new self contained monopropellant Accessory Power System (APS) which develops up to 10 hp for missile or manned aircraft emergency requirements. Operation starts with ignition of an acceleration cartridge (1) providing direct energy to the turbine. (2). Simultaneously, ignition of the main cartridge (3) transmits pressure to a fuel cylinder piston (4) that feeds the monofuel into the decomposition chamber (5). Hot gas from the decomposing fuel drives the turbine and maintains pressure in the fuel accumulator (6). At 65,000 rpm, the turbine requires a single stage reduction gear (7). If operated at 24,000 rpm, the turbine drives the accessories directly, eliminating gear weight. In either case, shaft speed is maintained constant by a load-biasing alternator (8) controlled by a frequency detector (9) that picks up a signal from one of the output alternators (10). Reduction gearing (11) drives the hydraulic pump (12) at 12,000 rpm. (From 8-page bulletin GEA-6672, General Electric Co., Schenectady 5, N. Y.)

For this literature circle 334 on inquiry card.

Delay Line Definitions



Delay Time: (T) Elapsed time between the 50% amplitude of the input pulse leading edge and the 50% amplitude of the output pulse leading edge.

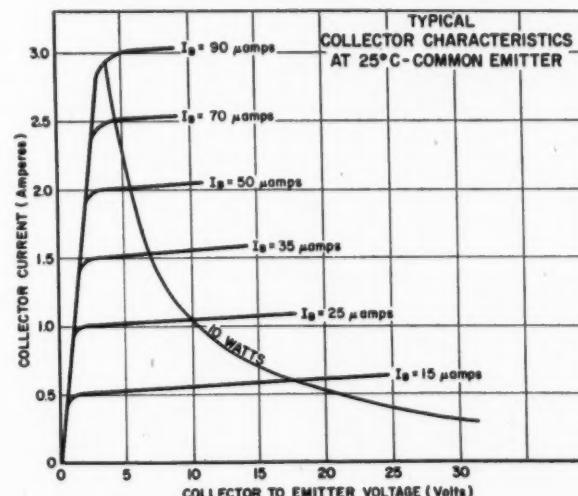
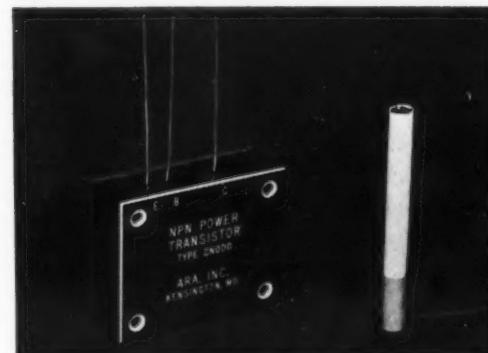
(From 12-page Delay Line catalog, ESC Corporation, 534 Bergen Blvd., Palisades Park, N. J.)

For this literature circle 316 on inquiry card.

Germanium-Silicon Transistor Combines Signal and Power Characteristics

A composite germanium-silicon NPN "Super Transistor" having unusual characteristics is said to be ideally suited for linear amplifiers and non-linear switching applications having high-impedance driving sources, in common-emitter, common-base, or common-collector configurations. Typical collector characteristics for the common-emitter connection are shown.

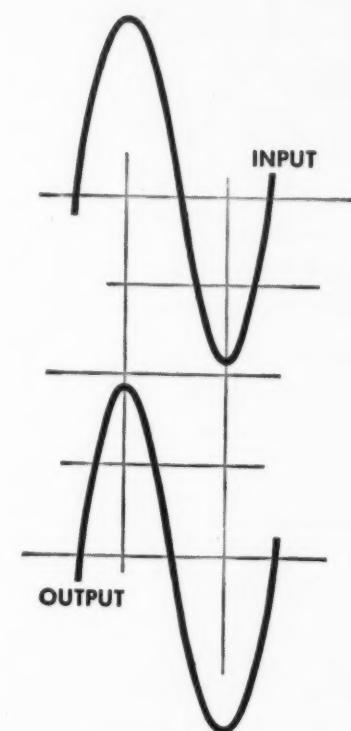
It combines the general characteristics of a small signal transistor at the input, a power transistor at the



output, and the overall gain of a cascaded amplifier with thermal compensation to prevent adverse thermal runaway effects under load. Designated ARA-25N (RETMA No. 2N626 reserved), the new transistor has a current gain of 15,000 to 40,000, an input impedance of 2,000 ohms, output impedance of 500 ohms, and a power rating of 10 watts. Its maximum junction temperature is 100°C. A matching PNP and units of higher power ratings, using the same techniques, are also under development by the Semiconductor Division of Advanced Research Associates, Inc., of Kensington, Md.

For more information circle 317 on inquiry card.

NO WAVEFORM PROBLEMS



You can . . .
Simplify
Design Circuitry
With G-E Inductrol*
Voltage Regulators

The G-E Inductrol voltage regulator does not introduce harmful waveform distortion in your circuits.

Because it's an induction device, this voltage regulator offers you the advantages of brush-free operation . . . no voltage drift and tubeless control. Result: the ultimate in reliable voltage control.

For more information write Section 425-16, General Electric Company, Schenectady, New York.

*Registered trademark of General Electric Company for Induction Voltage Regulators

Progress Is Our Most Important Product
GENERAL  **ELECTRIC**

For more information circle 14 on inquiry card.



**WILL THE
MEANS OF
TODAY MEET
THE DEMANDS
OF TOMORROW...**

Yes—when
Bold Engineering concepts...
Experienced, efficient research
and development...
Precision manufacturing facilities
... combine to produce
electrical, electro-mechanical
and electronic products for
automation and instrumentation.
These are a few of the
answers to be found at Boehme's.



**THE FINE PITCH
PRECISION GEARS,**

created through the practical
experience of Boehme
Craftsmanship in design,
engineering and production play
an important role in helping to
meet these demands of tomorrow.
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915 Broadway New York 10, N.Y.
For more information circle 15 on inquiry card.



tunnel models, or other space-limited
applications requiring high accuracy.
Output is approximately 32 mv full-
scale open-circuit with 8-v excitation,
with maximum allowable static ac-

AIR-DUCT DRAIN VALVE

New stainless steel self-operating
drain valve reduces corrosion in pres-
surized ducts by removing water as
it accumulates in low spots. Tungsten-



celeration of two times its rated range
of 20 G. Circuit forms a complete
balanced bridge of 300-ohms nominal
resistance.—*Statham Instruments,
Inc.*, 12401 W. Olympic Blvd., Los
Angeles 64, Calif.

For more information circle 403 on inquiry card.

VARIABLE TOROID

New ATE-11 and ATE-12 sub-
miniature encapsulated variable to-
roids for missile application have elec-
trical specifications equivalent to
Burnell type AT-11 and AT-12

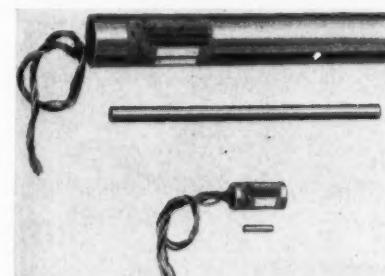


AJUSTOROID. Developed for
printed circuits and similar weight
applications these toroids provide
stepless adjustment of inductance
over 10% range without strain on
printed circuit mounting. Weighing
approximately $\frac{1}{2}$ oz it has applica-
tions in guided missile and similar
fields.—*Burnell & Co., Inc.*, 10 Pel-
ham Parkway, Pelham, N. Y.

For more information circle 404 on inquiry card.

**LINEAR DISPLACEMENT
TRANSDUCERS**

New COMPU-TRAN Displacement
Transducer features long linear
range, high-output and linearity rang-
ing from 0.1% to 0.5%, in sizes from
miniature models for missile applica-
tions to larger units up to 1" linear
range. Coils and lead wires are potted



in shock-resistant high-temperature
epoxy, with stainless-steel shielding
for normal environments or magnetic
shielding for protection from external
magnetic disturbances.—*International
Resistance Co., Computer Components
Div.*, 401 N. Broad St., Phila. 8, Pa.

For more information circle 402 on inquiry card.

LINEAR ACCELEROMETER

New A52 accelerometer, using un-
bonded strain gage principle and
weighing only 7.2 grams, is for use in
missile guidance systems, vibration
studies on aircraft or missiles, wind

FLOATED RATE GYRO

New miniature RG-100 rate gyro,
capable of withstanding 100 G's shock
and vibration of 15 G's at 2000 cps,
is said to be the smallest with con-
trolled fluid damping. Only 2" long
and 3 oz, the RG-100 is intended pri-
marily as a control and stabilizing



element in missile and aircraft ap-
plications. Uniform damping over the
operating range, from 20° to 800° /sec
inputs, and from -40° to 200° F
temperatures, is accomplished by
varying the shear damping area. The
viscosity of the damping medium,
which changes with temperature, is
used as a sensing device.—*Fairchild
Controls Corp., Components Div.*, 225
Park Ave., Hicksville, L. I., N. Y.

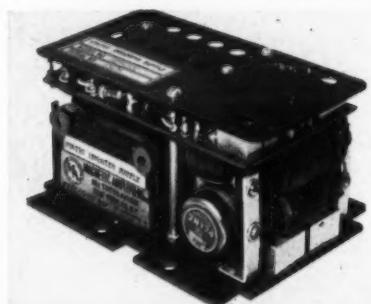
For more information circle 405 on inquiry card.

carbide ball blocks valve opening and
is held in place by duct pressure.
When pressure is reduced below 10 psi
by system shut-off, spring forces ball
out of valve opening and allows drain-
age. Increase in duct pressure re-
closes valve.—*Barber-Colman Co.,
Aircraft Controls Div.*, 1400 Rock St.,
Rockford, Ill.

For more information circle 406 on inquiry card.

STATIC INVERTER SUPPLIES

New precision-frequency Static In-
verter power supplies are designed
for gyro wheel supplies and other
400-cycle aircraft, missile and com-
puter applications. Features: precise



output frequency ($\pm 0.01\%$), rugged-
ness, excellent waveform, fast start-
ing time, good voltage regulation,
light weight, meets military specs.—*Magnetic Amplifiers Inc.*, 632 Tinton
Ave., New York 55, N. Y.

For more information circle 407 on inquiry card.

**AIRBORNE MAGNETIC TAPE
RECODER**

New Type 5-702 Magnetic Tape Re-
corder which meets or exceeds IRIG



and NATC specs operates at altitudes
up to 100,000' and from -55° to
 100° C. Features include electrical se-

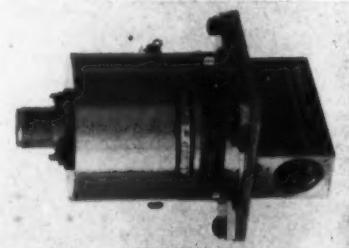
MILITARY AUTOMATION

lection of 6 tape speeds, of 1% to 60 ips; elimination of belts and pulleys; and convenient grouping of controls. Separate reproduce and recording head stacks permit downstream monitoring of all tape tracks simultaneously with recording of data. Recorder also may be used as laboratory playback machine. Available in 7- or 14-track models, using $\frac{1}{2}$ " or 1" tape respectively.—*Consolidated Electrodynamics Corp., 300 N. Sierra Madre Villa, Pasadena, Calif.*

For more information circle 408 on inquiry card.

SOLENOID BALL VALVE

New 2-way, 2-position ball valve for hydraulic, pneumatic or cryogenic applications, allows unrestricted straight-thru flow with an equivalent orifice of 0.250" diameter and $\frac{3}{8}$ "

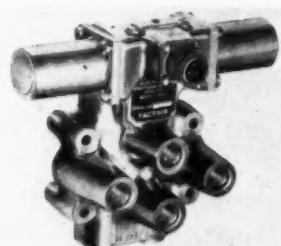


tube size available in pressures up to 4500 psi. and temperature ranges of -300° to 300° F. A momentary electrical surge of $2\frac{1}{2}$ amps is required for actuation. A 24 v dc solenoid is furnished with the standard unit. The valve can be supplied either normally open or normally closed.—*Pneu-Hydro Valve Corp., 364 Glenwood Ave., E. Orange, N. J.*

For more information circle 409 on inquiry card.

PNEUMATIC SELECTOR VALVE

New Tactair model 9801 4-way, solenoid-operated, pneumatic selector valve for use in a rocket release system, is applicable where low leakage, small size, light weight, and low 0.5-amp current drain are desirable but where quick response is needed.



Measuring only 5 $\frac{1}{8}$ " across the solenoids and weighing less than 1.9 lb, its normal operating pressure is 1250 psi, proof pressure is 4500 psi, burst pressure is 7500 psi, and operates over temperatures from -65° thru 160° F.—*Tactair Valve Div., Aircraft Products Co., 300 Church Rd., Bridgeport, Pa.*

For more information circle 410 on inquiry card.

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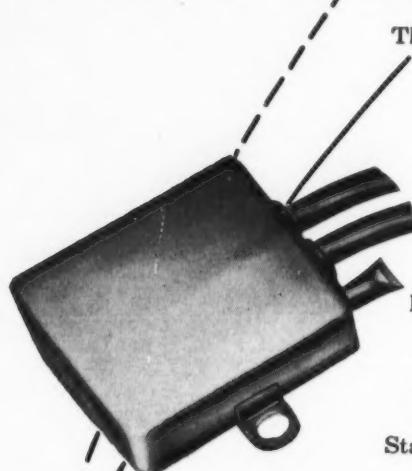


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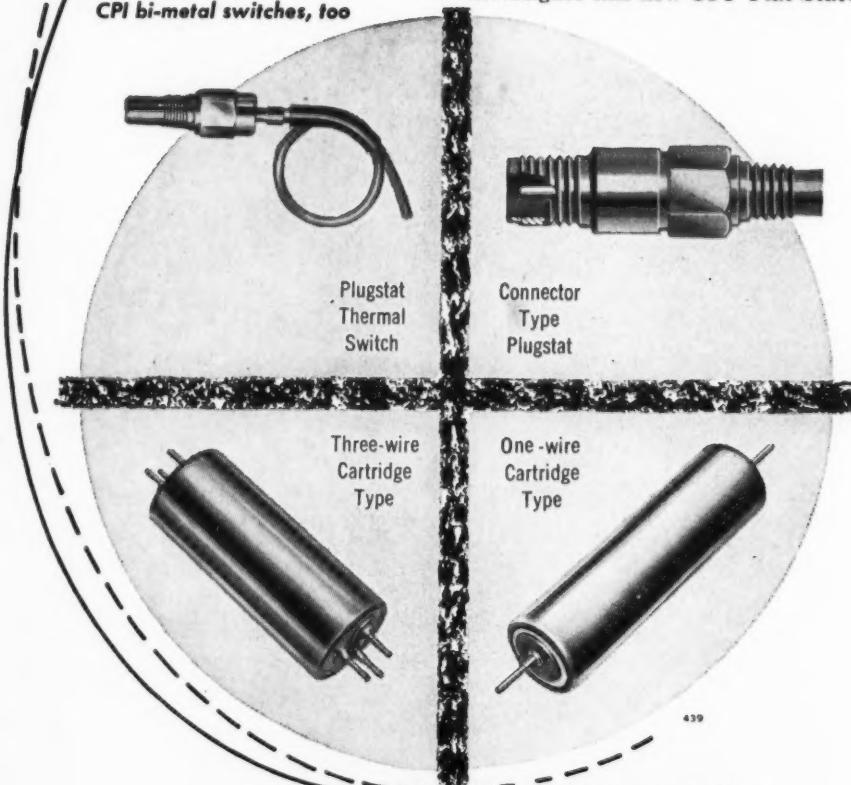


This new, highly sensitive, light weight, (weighs slightly more than $\frac{1}{2}$ ounce) flat thermostatic switch is adaptable to signal unsafe surface or internal temperature of transformers, relays etc. as well as to control air conditioners in planes, and on motors and heaters. Because it is hermetically sealed, this new Flat-Stat can be immersed in non-conductive liquids to control temperatures in baths.

The Flat-Stat is available in 2 Amp. and 6 Amp. models. Calibration temperature range is -20°F to $+650^{\circ}\text{F}$ with momentary overshoot to 800°F . Standard tolerance is $\pm 10^{\circ}\text{F}$ but can be set to $\pm 5^{\circ}\text{F}$ if necessary. Repeatability is approximately $\pm 1^{\circ}\text{F}$.

Wherever the need calls for a small, extremely accurate switch, investigate this new CPI Flat-Stat.

Ask about these
CPI bi-metal switches, too



Ask our representative
to tell you how CPI can help you solve
your temperature control problem—and remember
—when temperatures are high (or low) you can depend on CPI
Write for complete engineering data.

Ask for catalog MA.

Control products, inc.

HARRISON, N.J.

For more information circle 17 on inquiry card.

New Products—Cont.

PRESSURE TRANSDUCER

New Model P222 pressure transducer is designed for measurement of gage, differential and absolute pressures in air load measurements, wind tunnel models, etc. Circuit forms a complete bridge with nominal resis-



tance of 200 ohms, having output of approx. 15 mv full-scale open circuit with 3v excitation. Wide ambient temperature limits of -100° to $+275^{\circ}\text{F}$, and availability of pressure adapters for conversion to closed line applications, extend potential use of this instrument.—*Statham Instruments, Inc.*, 12401 W. Olympic Blvd., Los Angeles 64, Calif.

For more information circle 411 on inquiry card.

IR AND OPTICS

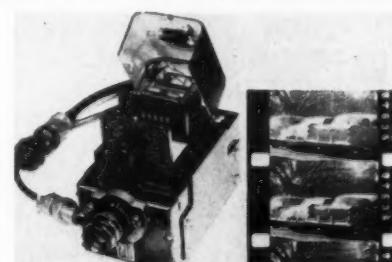
SCINTILLATION RADIACT

New rapid response gamma radiation counter integrates the number of counts over a specified time period to produce a periodic dc-signal having an amplitude proportional to the radiation intensity. It consists of a 2" diameter by 2" long sodium iodide crystal which produces an over-all count rate of 11,000 counts/second/MR-hr. The output can be read out or used to activate an alarm.—*Stanley Aviation Corp.*, 2500 Dallas St., Denver 8, Colo.

For more information circle 412 on inquiry card.

PHOTOGRAPHIC MECHANICAL COUNTER

New Traid Model 652 Correlation Counter provides a positive method of correlating events recorded by two or more cameras. Correlation counter mounts on a bracket attached to camera and displays lighted numbers

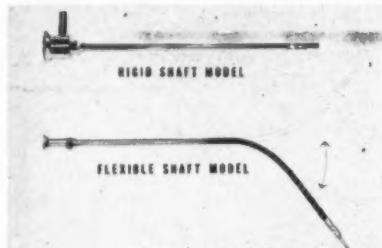


in front of the shutter. The number displayed is recorded on the edge of the film frame. By mounting the device on each of several cameras or instruments, and activating the counters simultaneously, a common number appears on frames which are related in time, providing positive correlation.—*Traid Corp.*, 17136 Ventura Blvd., Encino, Calif.

For more information circle 413 on inquiry card.

OPTICAL INSPECTION INSTRUMENT

New BORE-O-SCOPE high-precision optical instrument is designed for inspection of internal portions of aircraft engines, aircraft propellers, machines and machined components, foundry castings, chemical process

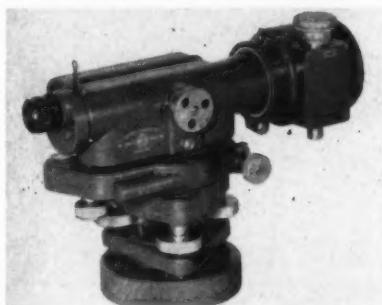


equipment, tools, fixtures, equipment in atomic energy installations, etc. Available in sizes from $\frac{1}{8}$ " O.D. in a complete range of lengths from 8" to over 15'. Optics are coated to achieve maximum light transmission.—*Size Control Co.*, 2500 W. Washington Blvd., Chicago 12, Ill.

For more information circle 414 on inquiry card.

OPTICAL LEVEL

New Mark IV Microptic Level B131A for missile, atomic reactors, airframes, ship building, machine tool erection, and precision leveling in general industry, assures maximum ac-



curacy for optical tooling use. Strain-free split precision bubble assures leveling to a pointing accuracy of 0.002° in 100'; the optical micrometer reads to 0.001° . Meets USAF requirements.—*Engis Equipment Co.*, 431 S. Dearborn St., Chicago 5, Ill.

For more information circle 415 on inquiry card.

HI-SENSITIVITY 1" VIDICON

New RCA-7038 1" vidicon camera tube for color and black-and-white is designed for broadcast, industrial and military TV applications. Broadcast pictures with as little as 1 ft-candle of highlight illumination on

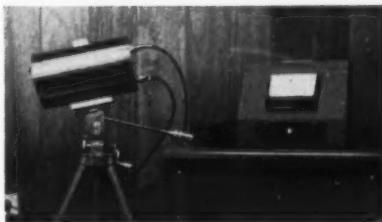


its faceplate are possible. Maximum resolution is approximately 600 television lines, with spectral response covering the entire visible spectrum.—*Radio Corporation of America, Electron Tube Div.*, Harrison, N.J.

For more information circle 416 on inquiry card.

HIGH SPEED I-R RADIOMETER

New Thermodot ultra-high-speed radiometer rapidly and accurately measures thermal radiation from surfaces a few degrees above ambient to extremely high temperatures. Infrared pulses of only 1 μ sec duration can be detected. It is adapted to studies of



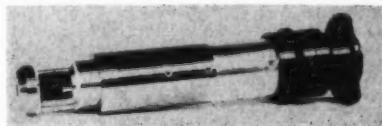
missile and aircraft structures under thermal load, of infrared analysis of transient reactions in high performance fuels, and the surface temperatures of materials and structures traveling or rotating at high speeds.

—*Radiation Electronics Corp., 8241 N. Kimball Ave., Skokie, Ill.*

For more information circle 417 on inquiry card.

SUPersonic LENS

New supersonic lens of fused quartz and silicon to withstand heat, friction, shock and vibration at airborne speeds of Mach 4 and higher, also

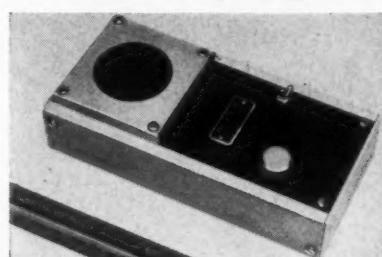


has low aerodynamic drag, does not heat excessively at high speeds. Serves as periscope to a 16mm camera, providing a 30° view. Focal length is 22mm and speed is f 3.5. The iris diaphragm operates under loads up to 25 G. Waterhouse stops are available for higher acceleration loads.—*Traid Corp., 17136 Ventura Blvd., Encino, Calif.*

For more information circle 418 on inquiry card.

SNOOPERSCOPE DETECTOR

New infrared detection device, self-contained and battery powered, detects invisible Snooperscope beams over a half-mile range and gives audi-

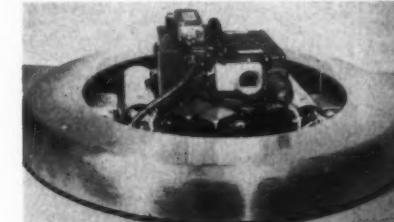


ble warning. Also can be adapted to fail-safe fire alarms, infrared communications, and accurate location of infrared sources. Available in smaller and 115 v models.—*Lindly & Co., Inc., 248 Herricks Rd., Mineola, L. I., N. Y.*

For more information circle 419 on inquiry card.

AIRBORNE CAMERA SYSTEM

New Fotodome camera system for high-speed aircraft and missiles, mounts on exterior surfaces of test aircraft to record mechanical operation of aircraft components or on target drones to record miss distance of missiles. Can also be mounted on



firing aircraft to record missile aircraft performance and intercept. One version of Fotodome consists of a circular aluminum base plate 24" dia x 8" high covered by clear plastic dome, optically ground and polished, with one or more motion picture cameras, power supplies, timing and sequencing apparatus, and other accessories.—*Traid Corp., 17136 Ventura Blvd., Encino, Calif.*

For more information circle 420 on inquiry card.

RADIO-RADAR TELEMETERING 400-CYCLE SUPPLY

New Model No. M-786 regulated ac power supply for magnetic amplifiers has input of 108-121v 1- ϕ , 380-420 cps; with ac output of 5.7 v rms at



2.5-5 amp. Regulation is $\pm 1\%$ true rms with any combination of input voltage, frequency, and load changes. Built to Mil Specs, its regulation is guaranteed from -40° to 150° F.—*Perkin Engineering Corp., 345 Kansas St., El Segundo, Calif.*

For more information circle 421 on inquiry card.

CRYSTAL OVEN

New JK09S oven for housing quartz crystals, diodes, resistors and capacitors features "Snap Action" bi-metal thermostat. Meets mil specs and pro-

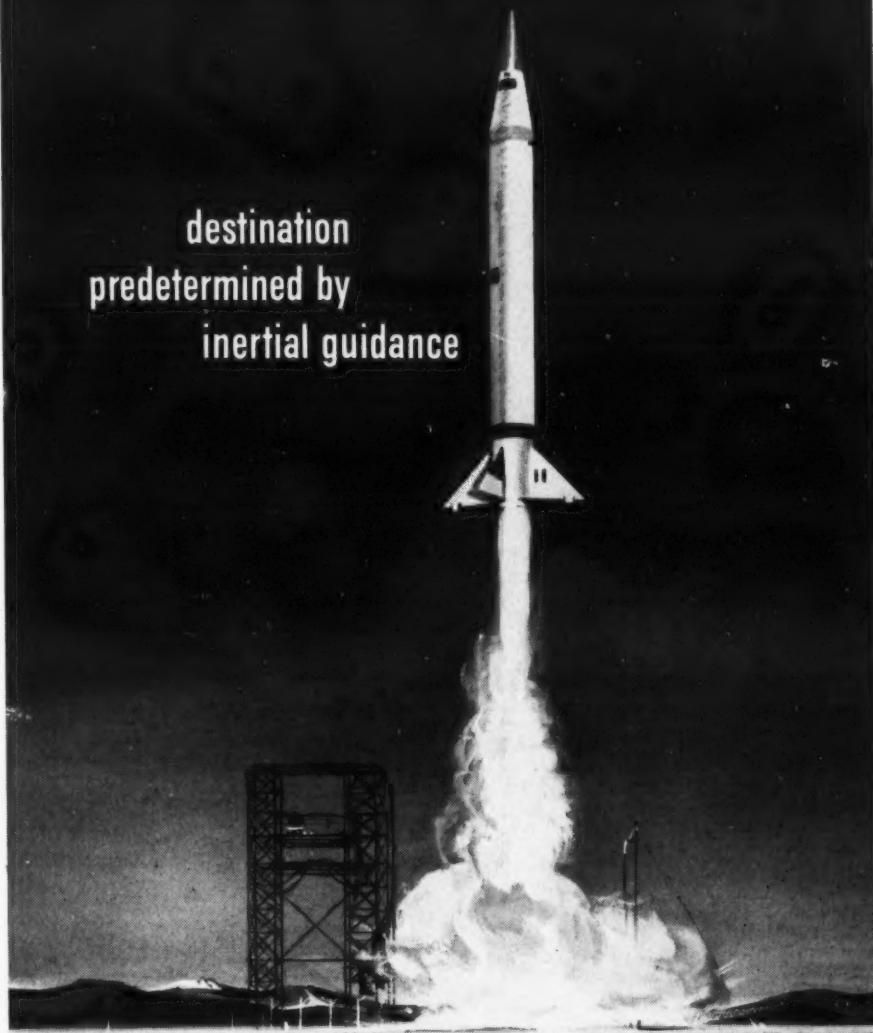


vides operating temperatures from 55° to 105°C with temperature stability of $\pm 0.5^\circ\text{C}$. Heater voltage is 12 v to 115 v.—*James Knights Co., Sandwich, Ill.*

For more information circle 422 on inquiry card.

Kearfott's creative engineering and production experience assures the precision and reliability of their inertial guidance systems for the successful performance of all airborne equipment.

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predetermined by
inertial guidance



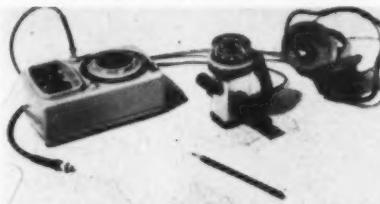
KEARFOTT COMPANY, INC., LITTLE FALLS, N. J.

Sales and Engineering Offices: 1378 Main Ave., Cliffside, N. J.
Midwest Office: 23 W. Calender Ave., La Grange, Illinois
South Central Office: 6211 Denton Drive, Dallas, Texas
West Coast Office: 263 N. Vinewood Avenue, Pasadena, Calif.

For more information circle 18 on inquiry card.

LIGHT-WEIGHT RADIO AND RDF

English-built, transistorized radio communications receiver (Homer) and radio direction finder (Heron) system (recently used by Sir Edmund Hillary on his dash to the South Pole) is now available in the U. S. Designed for receiving marine and aeronautical



beacons, weather forecasts, and broadcasts, and powered by four dry cells, it will give 500 hrs continuous operation with headphones, or approximately 350 hrs on loudspeaker operation. Direction finder locates beacon or range stations within 1%.—George D. O'Day Associates, Inc., 9 Newbury St., Boston 16, Mass.

For more information circle 431 on inquiry card.

BROADBAND RF AMPLIFIERS

New Model HFW Octave RF amplifiers each provide broadband bandpass amplification covering an octave or more of frequency in 40 to 600 mcs spectrum with low noise, high gain, and low power drain. GE type GL-6299 co-planar triodes combined with



multi-pole networks provide amplifiers with power gains of 5.5 db or greater per stage, with a 300 mcs bandwidth. Several stages are cascaded to provide gain of 20 or 30 db each.—Engineering Sales Dept., Applied Research Inc., 76 S. Bayles Ave., Port Washington, N. Y.

For more information circle 432 on inquiry card.

SUBMIN RADAR BEACON

New airborne radar beacon of 2½" dia. and weighing 6 lbs has been developed for use in jet aircraft attaining Mach 6 speeds and 500,000' altitude. Beacon develops a coded pulse



reply to single-pulse transmissions from tactical radar sets, enabling radar operator to track and identify each aircraft where several are involved.—Stavid Engineering Inc., U. S. Highway 22, Plainfield, N. J.

For more information circle 433 on inquiry card.

STANDARD CELL OVEN

New SCO-106 precision laboratory oven provides short term regulation of 0.01°C permitting 2μv stability in standard cell voltage. Long term regulation is 0.05°C. Built-in thermal re-



sistance bridge permits measurement of enclosure temperature to 0.005°C. Capacity is 3 cells permitting cell intercomparison. Heater supply is 24 to 28 vdc.—Julie Research Labs., Inc., 556 W. 168 St., New York 32, N. Y.

For more information circle 434 on inquiry card.

CRYSTAL OSC AND OVEN

New Bulova AM-03 100-kc temperature-controlled packaged crystal oscillator features stability of 1 part in 10⁷ over 24 hrs. The transistorized oscillator and oven (3" x 5") is ap-



plicable for airborne and missile requirements, meeting MIL-E-5272, and is available with special shock mounting to withstand vibrations at 15 G up to 2000 cycles. Operating temperature range is from -40° to 70°C.—Bulova Watch Co., Electronics Div., P-966, Woodside 77, N. Y.

For more information circle 435 on inquiry card.

VHF PANORAMIC RECEIVERS

New all-electronic TRAK panoramic receivers covering 35 to 150 mc fea-



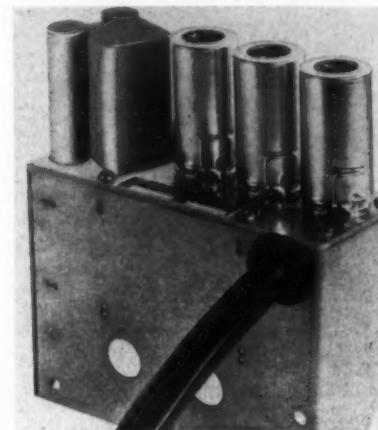
ture three controllable-inductor-tuned RF stages in a double-superhetrodyne circuit to attain over 60-db attenuation of spurious responses, a noise figure as low as 4.5 db, and sensitivity

of 0.5 μv. 5" flat-faced CRT displays received signals logarithmically with range of 60 db observed as 8 to 1 variation in amplitude. Precision marker measures signal frequency within 1% accuracy.—CGS Labs., Inc., 391 Ludlow St., Stamford, Conn.

For more information circle 436 on inquiry card.

NOISE CUTOUT

New ASCOP MNC-1 Noise Cutout Unit provides rapid recovery of telemetered signals following noise bursts. During signal drop-out, control-loop voltage levels are stored to provide waveform restoration with minimum

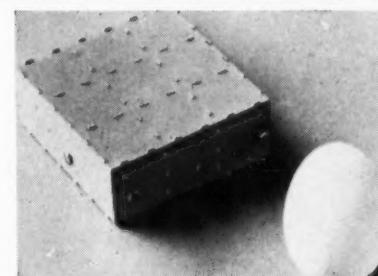


loss of data due to recovery time factors. Automatic response is to step changes in reference levels of over 10 v, and signal restoration accuracy after ½ min of drop-out is within 2% of full scale.—Applied Science Corp. of Princeton, P. O. Box 44, Princeton, N. J.

For more information circle 437 on inquiry card.

SUBMIN LC EGG CRATE FILTER

New subminiature LC "Egg Crate" Filter covers 0.4 to 60.0 mc depending



upon specific requirements; center frequency stability ± 1.0 kc per mc from -55° to 105°C. Small cells are welded together to form shield compartment providing continuous mechanical and electrical bond. Suitable for use in missile and aircraft receivers, AM/FM or FM/FM Data Link receivers, UHF and VHF mobile, ship-borne and ground station receivers, and in development work on RF amplifiers, IF amplifiers, detectors and post detector circuitry.—The Daven Company, 500 W. Mt. Pleasant Ave., Livingston, N. J.

For more information circle 438 on inquiry card.

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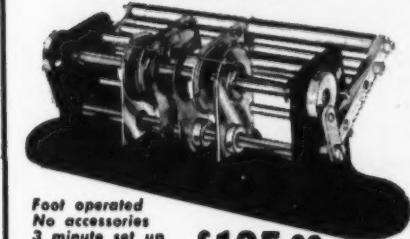
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For more information circle 20 on inquiry card.

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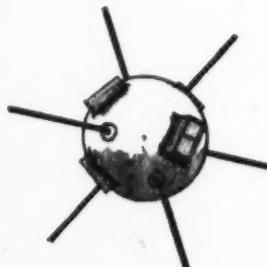
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- ✓ Metal film resistors, rod and disc
- ✓ Metallized glass attenuator plates, per MIL-A-11052A
- ✓ Mica resistance elements
- ✓ Resistance strips for temperature gauges
- ✓ Erosion gauges*

OPTICAL

- ✓ Anti-reflection Lenscote®
- ✓ Front surface mirrors
- ✓ Semi-transparent mirrors
- ✓ Density Filters
- ✓ Interference films for Infrared
- ✓ Anti-static coatings



*Metavac Resistance Strip used by Naval Research Laboratory on Vanguard Satellite to measure erosion caused by Meteor contact.

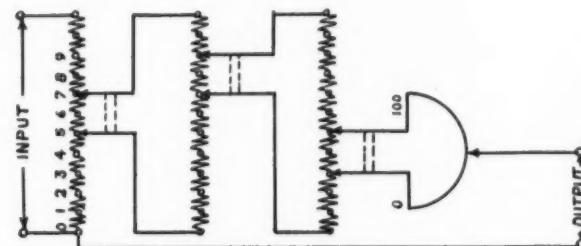
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For more information circle 21 on inquiry card.

Precision Voltage Dividers

The precision voltage divider, a laboratory instrument for measuring dc voltage ratios from 0 to 100,000 in steps of 1 with an accuracy of $\pm 0.001\%$ of the total, is useful for calibrating units involving linear, non-linear, trigonometric or exponential voltage functions, and can be used as the variable arm in a synchro bridge circuit. Essentially a Kelvin-Varley network, and consisting of three individual potentiometers and a slidewire in cascade, the circuit is equivalent to a continuously adjustable slidewire with exceptionally high resolution. (Fig. 1.)



Voltage dividers can be used with frequencies up to 400 cps and are designed to carry a maximum input voltage of 250 v dc. The resistors are non-inductively wound on ceramic spools using resistance wire having a temperature coefficient of less than $\pm 0.000015^\circ\text{C}$, between limits of 15° to 35° C .—(From 2-page bulletin #105, Gray Instrument Co., 200 E. Church Lane, Philadelphia 44, Pa.)

For this literature circle 318 on inquiry card.

Magnetic-Core Delay Lines

Two new lumped-constant magnetic-core delay lines (Magline series WM and XM) use magnetic inductors, subminiature precision capacitors, and printed circuit techniques, and have delays ranging from 1 to 80 μsec with characteristic impedances from 200 to 2,000 ohms. A typical 2 μsec Magline has a delay-to-rise-time ratio of 100:1, low distortion, and bandwidth of 55.7 mc. Capacitors with wide range of thermal coefficients of capacitance are in some cases balanced against thermal coefficients of inductance to produce a delay line with a low thermal coefficient of delay.

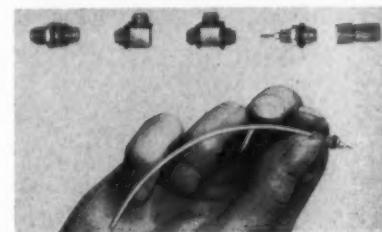
The bandwidth-delay per unit volume is 7.3 ($\text{mc}\cdot\mu\text{sec}$) / in^3 for the WM series and 7.1 ($\text{mc}\cdot\mu\text{sec}$) / in^3 for the XM series. Delay-to-rise-time ratios of 30:1 are attainable with the WM series and 80:1 to 100:1 with the XM for pulses of conventional length. Temperature range is -55° to 125°C , and altitude to 80,000'. (From 4-page Engineering Data Sheet No. 41 by The Jacobs Instrument Co., Bethesda 14, Md.)

For this literature circle 319 on inquiry card.

New Products—Cont.

MICRO-MIN COAX CONNECTORS

New micro-miniature connectors for use with coaxial cables with jacket diameter from 0.069" to .080"; or with

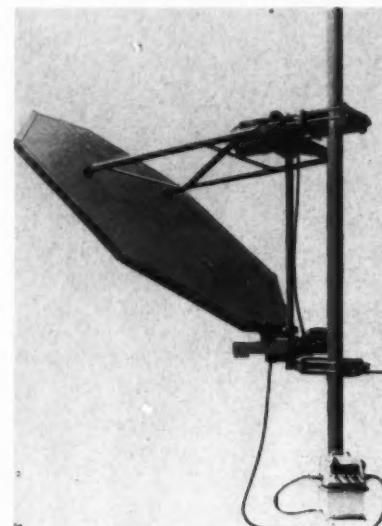


adapter, with cables 0.058 to 0.068" dia. Slotted collet-type device clamps braid to secure the outer jacket.—Automatic Metal Products Corp., 315 Berry St., Brooklyn 11, N. Y.

For more information circle 439 on inquiry card.

MOTORIZED PASSIVE REFLECTOR

New reflector can be driven in azimuth and elevation under load conditions from a remote location, uses the sandwich principle—the 0.020" thick solid aluminum skins being bonded



under pressure to the honeycomb core. Surface is flat to a tolerance of $\frac{1}{16}$ " and reflector is usable for frequencies up to 7000 mc. Can be adjusted $\pm 5^\circ$ in elevation and $\pm 25^\circ$ in azimuth under a 40 lb/ft² wind and ice load.—The Gabriel Co., 135 Crescent Rd., Needham Heights 94, Mass.

For more information circle 440 on inquiry card.

FASTAR-NEW RADAR DEVELOPMENT

Using pulse repetition rates greater than those used in conventional radar, a new radar system called FASTAR, has been developed by the W. L. Maxson Corporation. Details are classified, but the system is claimed to

eliminate slow scanning necessary to achieve high resolution at long ranges using conventional low rep rates. Other advantages claimed are improved track-while-scan, three-dimensional data possibilities, and higher average power for no increase in peak power.—W. L. Maxson Corp., 460 W. 34th St., New York 1, N. Y. For more information circle 441 on inquiry card.

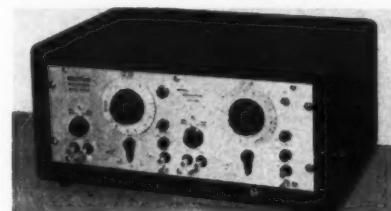
ANTENNA MULTIPLIER

New branching RF amplifier designed for Air Force applications accommodates six communications receivers on a single antenna without objectionable inter-action or inferior performance in individual circuits. Previously, each receiver required an individual antenna for optimum performance.—Hallamore Electronics Co., Div. of The Siegler Corp., 8352 Brookhurst Ave., Anaheim, Calif.

For more information circle 442 on inquiry card.

HI-PASS/LOW-PASS FILTERS

New Model LH-24D for applications demanding availability of response to d-c, or "zero" frequency, features two filter units used as independent filters

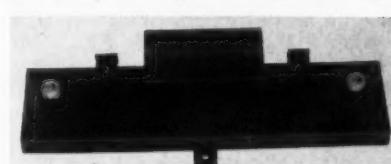


or interconnected to secure band-pass, bandstop, or highpass/lowpass operation with doubly steep rate of cut-off. Individual section cutoff frequency is continuously adjustable over five decades extending from 0.2 to 20,000 cps.—Spectrum Instruments, Inc., Box 61, Steinway Station, Long Island City 3, N. Y.

For more information circle 443 on inquiry card.

S-BAND ISOLATOR

New resonant absorption ferrite isolator for coaxial system operation from 2670 to 2930 mcs is particularly effective with power-amplifier type

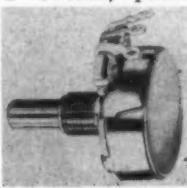


transmitters. Standard type "N" (50 ohm) connectors are used on both input and output of the basic waveguide structure. Electrical characteristics are: Isolation, 20 db min; insertion loss, 0.08db max; input VSWR, 1.20 max; power capacity, 10 w av with a 2:1 load VSWR.—Airtron, Inc., 1096 W. Elizabeth Ave., Linden, N. J.

For more information circle 444 on inquiry card.

VARIABLE RESISTOR

New high-temperature 2-watt Type 96 variable resistor has ambient operating temperature of -63° to $+150^{\circ}\text{C}$, meets MIL-R-94B. Available with SPST switch, printed circuit

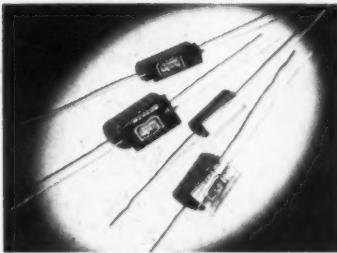


terminals, it can be furnished in 2 or 3 section concentric shaft and straight shaft tandem construction. Insulated parts are non-fungus-nutrient hi-temp silicon fibre glass construction.—Chicago Telephone Supply Corp., Elkhart, Ind.

For more information circle 445 on inquiry card.

SELENIUM RECTIFIERS

New line of selenium rectifiers for ac or dc are suppression are housed in hermetically sealed metal containers (SP3 series) or in moisture-sealed phenolic tubes (SP7 series).



Suitable for ac circuits drawing 600 ma at 150 v for dc circuits drawing 750 ma at 147 v, they eliminate arcing during opening and closing of contacts; yet have negligible effect on circuit operation.—Bradley Labs. Inc., 168 Columbus Ave., New Haven, Conn.

For more information circle 446 on inquiry card.

SILICON RECTIFIER

New Tarzian "K" series silicon rectifiers feature: capacity of 750 ma to 55°C (no heat sink), derating to 150°C ; axial leads; and positive epoxy



seal. Available in voltage ratings of 100, 200, 300 and 400 piv.—Starkes Tarzian, Inc., Rectifier Div., 415 N. College Ave., Bloomington, Ind.

For more information circle 447 on inquiry card.

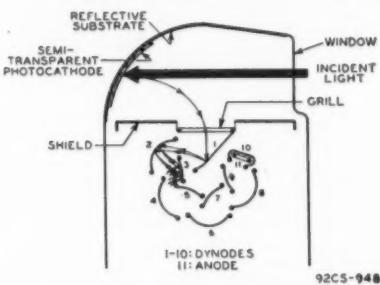
CLIP-ASSEMBLY SELENIUM RECTIFIERS

Three new Vac-u-Sel miniature half-wave selenium rectifiers are designed for low-power control devices, electric instruments, and similar electronic devices requiring small amounts of dc power. Rated at 2.5, 8, and 25 ma, all three models are available in piv ratings from 37 to 378 v.—General Electric Co., Schenectady 5, N. Y.

For more information circle 448 on inquiry card.

MULTIPLIER PHOTOTUBE

New RCA-7029 dormer-window-type multiplier phototube is designed for low-contrast applications. It features a median cathode sensitivity of $125 \mu\text{a/lumen}$ and a dormer window through which light is directed onto a semitransparent photocathode located



on the inner spherical surface at the end of the bulb. Special response is from about 2900 to 6200 Å with maximum response at approx. 4900 Å. The 7029 has very short time-resolution; for an input of 1 millimicrosecond or less, the time spread of the pulse at the anode is less than 5 μsec .—Electron Tube Div., Radio Corp. of America, Harrison, N. J.

For more information circle 449 on inquiry card.

GLASS ZENER DIODES

New Zener (glass) diodes for clipping, limiting, regulating and similar voltage-stabilizing applications, use gold alloyed ohmic contacts to function over temperatures from



-65° to 200°C . Rated at 250 mv at 25°C they are derated at 1 mw/ $^{\circ}\text{C}$ above 25°C .—Hoffman Electronics Corp., Semiconductor Div., 930 Pitner Ave., Evanston, Ill.

For more information circle 450 on inquiry card.

TRANSISTORS

New types ST400 and 2N389 high-power silicon transistors with ratings to 80 w, feature low-R_{ce} (typically

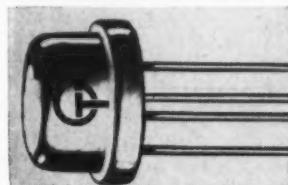


1.5 ohm) enabling these 60 v transistors to operate at currents to 5 amp. Are useful in servo-amplifier, relay driver, power switching, audio amplifier, dc-to-ac power converter and voltage regulator applications.—Transitron Electronic Corp., Wakefield, Mass.

For more information circle 451 on inquiry card.

HIGH FREQUENCY TRANSISTORS

New germanium drift transistors, using the diffused-base principle, are now capable of operating at higher frequencies than the germanium alloy type originally produced, making them useful in TV, high frequency oscillators, and very high speed switching computer applications. The newest

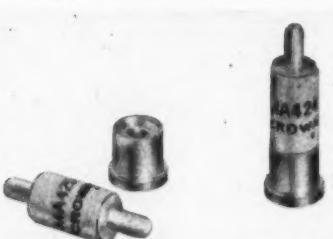


General Transistor drift transistors include very high-speed switching types 2N602 to 2N604 inclusive, and small signal amplifier, oscillator and converter types 2N605 to 2N608 inclusive with power gains from 20 to 32 at 2 megacycles. All are PNP and use a standard JETEC 30 welded case.—General Transistor Corp., 91-27 138th Place, Jamaica 35, N. Y.

For more information circle 452 on inquiry card.

MICROWAVE MEASUREMENTS DIODE

New MA-424 microwave crystal provides standardized law of detection and output voltage over a wide range of input power for measuring microwave power, voltage, impedance, power ratio and systems for microwave AGC and other types of control which rely on quantitative relation-



ships between input microwave power and resulting rectified DC. Interchangeable with other ceramic cartridge types, and tested at 9000 mc in a fixed tuned waveguide holder under a load resistance of 10,000 ohms, it can be used for reproducible power measurements at X-band and lower frequencies. Selection of proper operating level permits measurement of ratios such as VSWR.—Micro-wave Associates, Inc., Burlington, Mass.

For more information circle 453 on inquiry card.

SUB-MIN RESISTOR

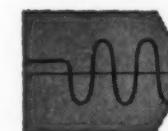
New deposited carbon resistor $\frac{1}{8}$ th watt (DCX $\frac{1}{8}$) meeting MIL-R-



10509B, is available in resistances from 25 ohms to 1 meg.—Electra Mfg. Co., 4051 Broadway, Kansas City, Mo.

For more information circle 454 on inquiry card.

NEW!
DC to DC and DC to AC
solid-state power converters
voltage regulated, frequency
controlled, for missiles,
telemetering, gyros, servos



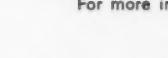
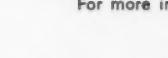
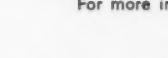
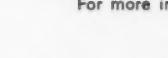
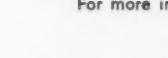
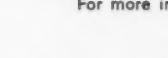
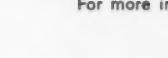
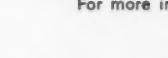
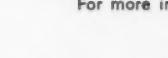
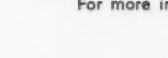
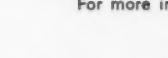
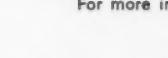
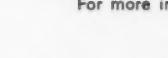
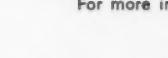
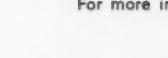
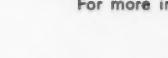
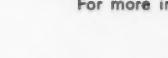
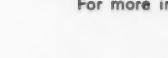
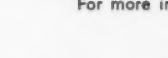
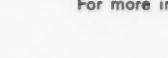
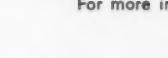
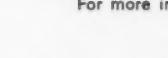
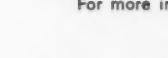
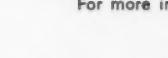
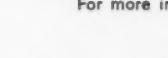
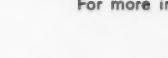
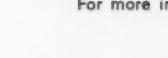
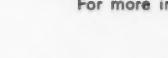
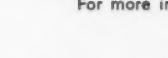
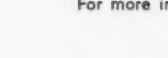
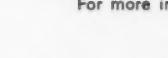
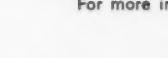
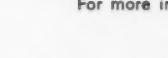
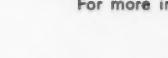
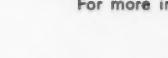
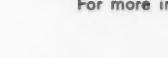
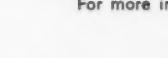
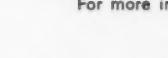
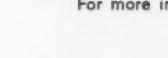
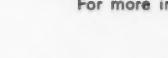
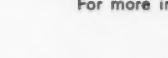
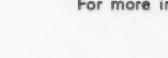
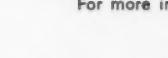
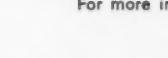
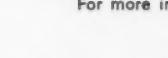
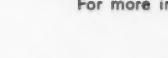
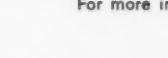
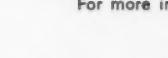
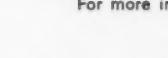
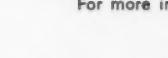
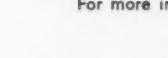
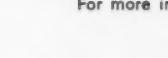
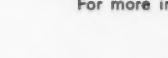
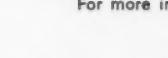
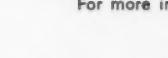
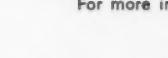
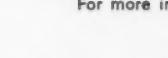
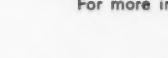
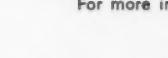
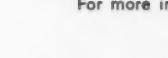
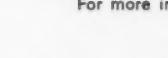
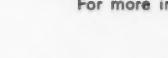
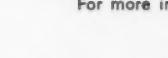
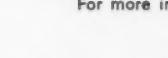
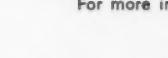
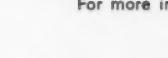
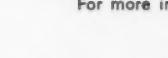
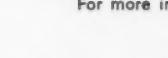
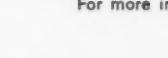
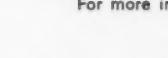
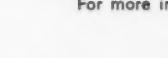
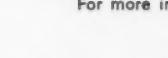
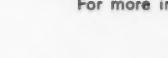
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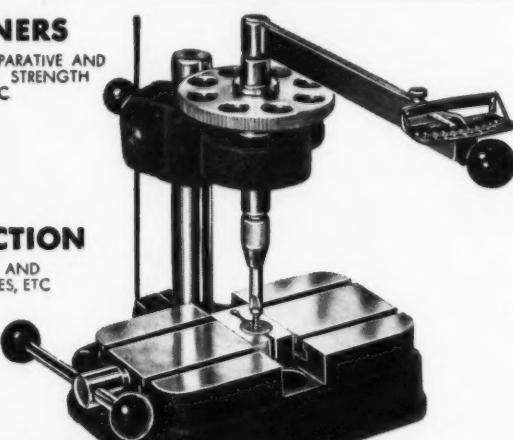
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364 Glenwood Avenue, East Orange, N. J.

For more information circle 23 on inquiry card.

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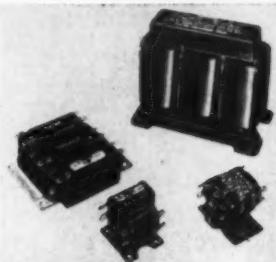
PA. STURTEVANT CO.
ADDISON, ILLINOIS

For more information circle 24 on inquiry card.

New Products—Cont.

ENCAPSULATED POWER TRANSFORMERS

New "Epseal" encapsulated power transformers employ coil construction

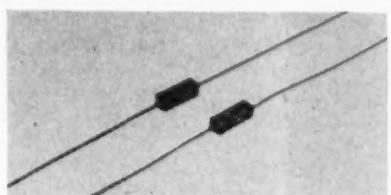


and high temperature insulation which permits greater miniaturization and reduces temperature rise as much as 50% under conventional construction. Features include moisture barrier, high winding space factor, and encapsulation techniques which achieve 100% saturation of coils for superior cooling.—*Electro Engineering Works, Inc.*, 401 Preda St., San Leandro, Calif.

For more information circle 455 on inquiry card.

HIGH TEMP RESISTORS

New GenRes high-temperature WW resistors for applications in missiles, rockets, aircraft and guidance control



systems, operate at 125°C at full rated load, derated to 0 at 145°C. Available in miniature and subminiature encapsulated sizes in axial or lug-type styles, MIL-R-9444 test results are available.—*General Resistance, Inc.*, 577 E. 156 St., New York 55, N. Y.

For more information circle 456 on inquiry card.

MULTI-TURN POTENTIOMETER

New $\frac{7}{8}$ " dia Series 55 multi-turn precision potentiometer provides 20% more winding length in 10 turns. Designed to MIL specs, it is rated at 3 watts, and is available in values up to 100,000 ohms. Is protected against humidity, salt spray, vibration, shock and temperature extremes to give



maximum stability, resolution and reliability.—*Clarostat Mfg. Co., Inc.*, Dover, N. H.

For more information circle 457 on inquiry card.

MIN PRECISION POT

New Model 087 precision potentiometer features a one piece, precision machined, aluminum housing with Class 5 stainless steel ball bearings.



Specifications: Total resistance—max. 20 K; standard electrical angle 340° ± 2 °, maximum continuity angle 350°; linearity, standard/special 1%/ 0.3% ; conformity 3%.—*George Rattray and Co.*, 116-08 Myrtle Ave., Richmond Hill 18, N. Y.

For more information circle 458 on inquiry card.

HI-TEMP POT

New lead-screw adjustment potentiometer designed for 175°C operation with 1.0-watt dissipation, combines a new Silverweld termination

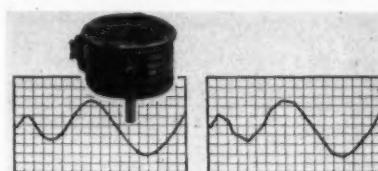


and a ceramic resistance card for high stability and reliability. Residual resistance at either end is less than 0.1%. Available in three terminal styles and in standard resistance values from 10 to 50,000 ohms.—*Bourns Laboratories, Inc.*, Riverside, Calif.

For more information circle 459 on inquiry card.

NO-PAD NONLINEAR POT

New nonlinear, precision, wire-wound ACEPOTS with terminal con-



formity to 0.25% without padding resistors, produce smooth output function curve as opposed to stepped function curve when padding resistors are used. Custom designed for particular applications, and also available in AIA sizes in sine, cosine, square law and logarithmic functions that meet MIL specs.—*Ace Electronics Assoc., Inc.*, 99 Dover St., Somerville, Mass.

For more information circle 460 on inquiry card.

PRECISION POT

New high reliability, high temperature, precision potentiometers are available in 8 standard resistance values (100 to 25,000 ohms). Two new $\frac{7}{8}$ " dia. models, Type 118F (bronze bearings) and 118H (bell bearings), feature linearity to $\pm 0.25\%$, up to

9 taps to $\pm 0.5\%$, and precision machined metal housings. Environmental specs include 100 megs insulation resistance after 10-day humidity test and less than 100 ohms resistance between contact and winding after vi-



bration and shock tests; will dissipate more than $\frac{1}{2}w$ at 125°C for 2000 hrs.—*Carter Mfg. Corp.*, 23 Washington St., Hudson, Mass.

For more information circle 461 on inquiry card.

TRIMMER POT

New 1958 A10-W Trimmer Potentiometer uses precision wire-wound resistance element and is available in values from 10 ohms to 100K ohms.

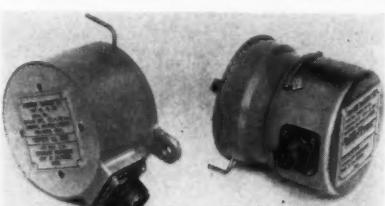


Standard tolerance, $\pm 5\%$; unit is rated at 1 watt up to 70°C; derating to 0 at 175°C. Trimmer adjustment is achieved with a 25-turn screw. The wiper blade has safety clutch to prevent internal damage from over-excitation. Meets Mil-Specs.—*Dale Products, Inc.*, Columbus, Neb.

For more information circle 462 on inquiry card.

PRECISION POTENTIOMETERS

Two new precision potentiometers to actuate the hydraulic servo valve in nose-wheel steering system of new B-58 Bomber consist of a nonlinear



control transmitter using 10:1 gearing system at shaft input and generating a nonlinear steering curve having slope ratio of 80:1, either side of center. Using three parallel linear elements and supplying a feedback signal proportional to nose wheel position, both operate in an AC bridge. Diodes, resistors and trimming resistors are contained within the potentiometer assemblies, forming part of a remote positioning system which requires no electric amplification.—*Technology Instrument Corp. of California*, 7229 Atoll Ave., N. Hollywood, Calif.

For more information circle 463 on inquiry card.

MILITARY AUTOMATION

New $\frac{7}{8}$ " dia a with lo

available 2; both circuit, air applicat Compon brook, For more

HI- New H Switch, SPST macts pe loads. C eury-tur points i ble or Kontro Geneva, For more

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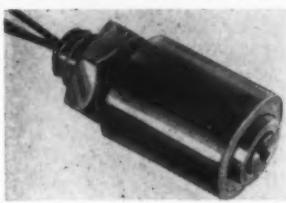
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porates $\frac{7}{8}$ " cer hole fo and by from minimi sistance

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MICRO-MIN POT

New Model MS-1 potentiometer, $\frac{1}{4}$ " dia and rated at $\frac{1}{4}$ watt, is wound with low-temp-coefficient wire. Also

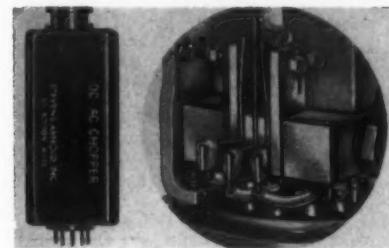


furnished.—Centralab, Div. of Globe-Union, Inc., 900 East Keefe Ave., Milwaukee 1, Wis.

For more information circle 467 on inquiry card.

MIN AC-DC CHOPPERS

New miniature choppers feature two independently adjustable, parallel connected contacts for increased



available is lead-mounting model MS-2; both are designed for printed circuit, airborne, missile, and satellite applications.—*Miniature Electronic Components Corp., Plymouth St., Holbrook, Mass.*

For more information circle 464 on inquiry card.

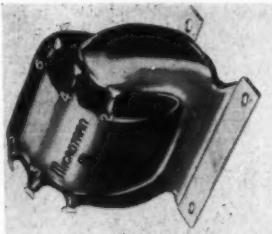
HI-POWER CONTACTOR

New hermetically-sealed Mega-Switch, in normally closed and open SPST models, breaks up to 100 contacts per minute under up to 3 kva loads. Gas arc-quenching and mercury-tungsten contacts make sticking points impossible, safe in inflammable or corrosive vapors.—*Energy Kontrols, Inc., 11 S. First St., Geneva, Ill.*

For more information circle 465 on inquiry card.

HI-TEMP TRANSFORMERS

New transformers meeting MIL-T-27A class Specifications will operate



reliably from -65° to 130°C in excess of 10,000 hours. Available to customer specs in hermetically sealed, encapsulated or impregnated construction.—*Microtran Co., Inc., 145 E. Mineola Ave., Valley Stream, N. Y.*

For more information circle 466 on inquiry card.

R-C FEEDTHRU

New Miniature Tube-R-Cap feedthru designated Centralab 732 incor-



porates a resistor and capacitor in a $\frac{1}{4}$ " ceramic tube mounting in a 0.190" hole for high-frequency antenna filter and by-pass applications. Capacities from 400 to 1000 μf (guaranteed minimum value) 1000 vdew, and resistances of 0.3 to 1 megohm can be

furnished.—Centralab, Div. of Globe-Union, Inc., 900 East Keefe Ave., Milwaukee 1, Wis.

For more information circle 467 on inquiry card.

VARIABLE DELAY LINES

New series EV-600 miniaturized electrically-variable lines have time delay as a function of applied voltage providing infinite resolution over 50% range of the nominal delay value. De-



lay range is 0.5 μsec to 50 μsec (variable 50% from nominal value); impedance range, 50 to 2,000 ohms; delay to rise time ratio, 5 to 50.—*ESC Corp., 534 Bergen Blvd., Palisades Park, N. J.*

For more information circle 471 on inquiry card.

MINIATURE PLUG-IN POWER SUPPLIES

New Plug-in power supplies feature plug-in mounting, line isolation, and cadmium plated cans; are potted to resist shock and vibration. Self



contained filament windings are provided on ac models and semiconductor diodes with built-in filtering on some models. Transistorized models are potted for low temperature applications, with ranges up to 600 v at 200 ma available.—*American Industrial Electronics, P. O. Box 14105, Houston 21, Texas.*

For more information circle 469 on inquiry card.

PRINTED CIRCUIT RELAY

New LR-1301 SPDT Relay for direct application to printed circuit boards uses palladium inlay contacts to assure positive contacts in "Dry Circuit" switching. Treated or untreated coils are furnished in resist-

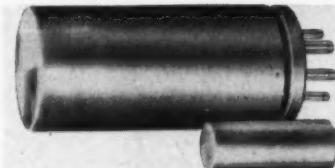


ances up to 10K, and terminals are mounted on glass epoxy, glass silicone, or phenolic blocks. Overall dimensions $\frac{1}{4}$ " square x $\frac{7}{8}$ "—*American Electronics Div. of American Monarch Corp., 81 N.E. Lowry Ave., Minneapolis, Minn.*

For more information circle 470 on inquiry card.

SOLID STATE INTERRUPTER

New VIBRISTOR component is a self-resonant, semi-conductor interrupter designed to replace vibrators in existing power supplies and for

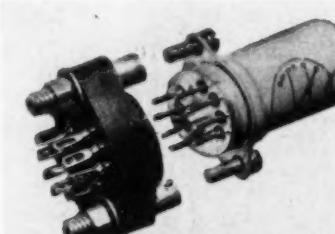


use in new equipment. Because operation does not depend on magnetic saturation, no current "spikes" occur, and output ripple and noise are eliminated. Frequency remains within $\pm 1\%$ for input voltage changes of $\pm 25\%$. Single units capable of switching up to 300 va at any frequency below 100 kc are available. No circuit changes necessary, just plug in.—*Vibration Research Laboratories, Inc., 58 Marbledale Rd., Tuckahoe, N. Y.*

For more information circle 472 on inquiry card.

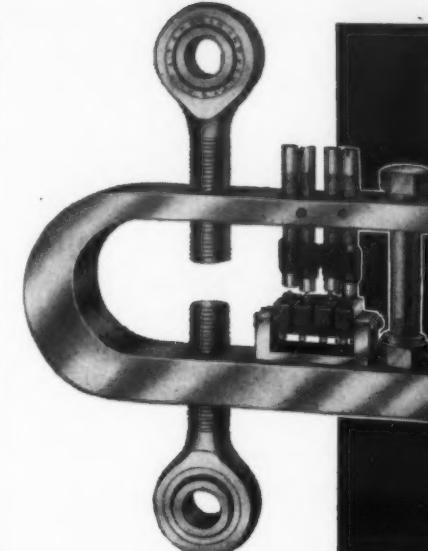
PLUG-IN RELAY

New HG-2SMP series plug-in relay with rotary action is supplied with an asbestos-filled melamine socket for rugged performance and



quick interchangeability. SPDT or DPDT contacts rated up to 5 amp, 250 v, with coils operating at 6 to 115 v, ac or dc, are available. Sockets can be supplied with several types of gold-plated terminals.—*Hi-G, Inc., Bradley Field, Windsor Locks, Conn.*

For more information circle 473 on inquiry card.



Here's the NEW Dillon force control switch

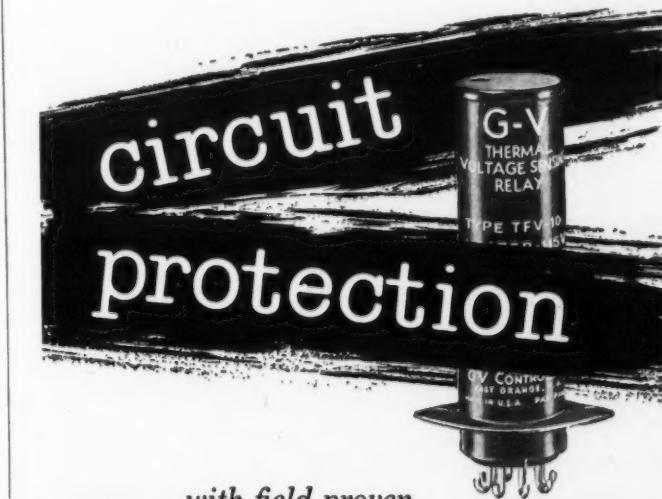
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- Triggers motors, rings bells, operates warning devices, etc.
- Protected against accidental overloading.
- Tensile or Compression Models available.

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For more information circle 25 on inquiry card.



with field proven
G-V THERMAL SENSING RELAYS

G-V Sensing Relays operate contacts when current or voltage to their heaters exceeds or drops below the operating point. They can be selected with a response rate paralleling the action of the equipment. These relays operate quickly on heavy changes but tolerate slight changes until they become dangerous.

Meets military requirements

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For more information circle 26 on inquiry card.

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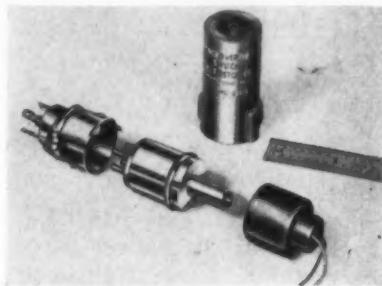
Company _____

Address _____

For more information circle 27 on inquiry card.

LOW-NOISE CHOPPER

New low-noise miniature Syncro-verter features low thermal-noise construction, for use in chopper-stabilized d-c amplifiers where thermal stability and extremely low noise are of prime importance. Interchangeable coils are

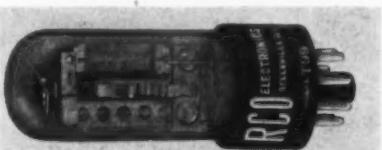


optimized for minimum power drive and thermal dissipation at preselected frequencies within range of 0-700 cps. Thermal stability is less than ± 2 microvolts; unit mates with a standard 4 pin miniature socket.—The Bristol Co., Waterbury 20, Conn.

For more information circle 474 on inquiry card.

THERMAL DELAY RELAY

New Model T-99 thermal time delay, actuated by internal heater and hermetically sealed for maximum stability, is designed for military and



communications applications. Operates on ac, dc, or pulsating currents to provide 2 sec to 3 min delay periods, unaffected by moisture, altitude or dust. When subjected to ambient temperature changes from -60° to 85°C , the relay delay interval varies slightly from room temperature delay periods.—R.C.O. Electronics, 145 Valley St., Belleville, N. J.

For more information circle 475 on inquiry card.

TRANSFORMER KITS

Design of blocking oscillators from NBS "preferred circuits" is simplified by use of new kit consisting of 8 oscillator units with 1:1:1 turns ratios and 2 interstage units with 5:1:1 turns ratios. Units plug into



7-pin miniature tube sockets and meet Mil-T-27A; are hermetically sealed, operate from -55 to $+105^{\circ}\text{C}$, at average power rating of 2 watts; max. duty cycle is 0.05.—Airpax Prod. Co., Middle River, Baltimore 20, Md.

For more information circle 476 on inquiry card.

TRANSISTORIZED SUPPLY

New Model PS-1011 transistorized transmitter power supply supplies more than 130 watts dc power, occupies 62.5 cu in and weighs 3.2 lbs. Input voltage is 28 vdc and two out-

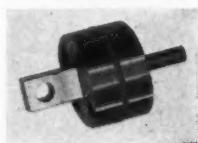


puts provide 500 v at 250 ma and 250 v at 25 ma. Regulation is better than 5% from half-load to full load with ripple below 0.15%. Capable of continuous operation under 100 G shock, 15 G to 2000 cps vibration, 100 G acceleration; operating temperature range -55° to 85°C .—Power Sources, Inc., Burlington, Mass.

For more information circle 477 on inquiry card.

DIFFUSED JUNCTION RECTIFIER

New diffused junction principle applied to rectifiers enables high efficiency, low forward resistance and high temperature operation (to 150°C). Models with ratings from 2 to 250

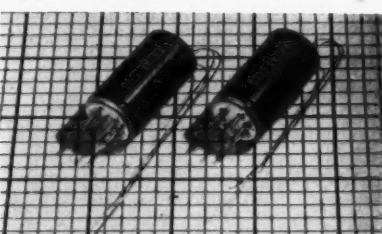


amp at 600 piv, and 400 amp at 350 piv, may be stacked to handle up to 5,000 amps capacity. Both positive and negative heat-sink units are available for bridge assemblies.—Trans-Sil Corp., 55 Honeck St., Englewood, N. J.

For more information circle 478 on inquiry card.

LOW-NOISE CHOPPERS

New type chopper has noise levels below 10 μV over a spectrum from a few cps to 40 kc. In particular applications, noise can be further reduced by restricting bandwidth following chopper. Contacts are rated for oper-



ation in dry circuits yet withstand surges as high as 2 ma at 100 v into resistive loads. Normal temperature range is -65° to 100°C , but higher temperature ratings can be supplied.—Airpax Products Co., Cambridge Div., Cambridge, Md.

For more information circle 479 on inquiry card.

POLYSTYRENE CAPACITOR

New polystyrene dielectric capacitor is reliable, rugged and has stability within 0.1% of original value after repeated tests. Lead attachment

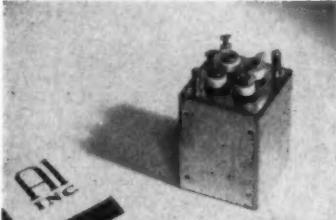


gives high uncased pull strength and uniform contact for minimum noise and power factor and to resist severe vibration and shock tests.—Diamond Electronics Corp., 64 White St., New York 13, N. Y.

For more information circle 480 on inquiry card.

POWER TOROID

New miniature, asymmetric 25-watt, 400-cycle transformer, available in ratings to 1,000 v, features small size

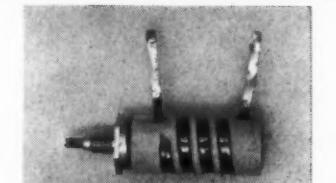


and low heat rise. Meets Mil-T-27.—Advance Industries, Inc., 640 Memorial Dr., Cambridge, Mass.

For more information circle 481 on inquiry card.

CERAMIC TUNABLE COIL

New 1300 series adjustable Hi-Q coils for low-power transmitters cover



range from 2-200 mc. Ceramic forms and "Permatune" cores are featured. Model 1300-B covering 50-100 mc is illustrated.—North Hills Electric Co., Inc., 402 Sagamore Ave., Mineola, L. I., N. Y.

For more information circle 482 on inquiry card.

MICRO MIN RELAY

New "Powrmite" 2-PDT hermetically sealed micro-miniature relay is



available in four mounting styles. Withstands shock of 50 G, 11 ms; vibration of 10-55 cps at 0.06 amplitude; and 55-2000 cps at 20 G.—Filters, Inc., 30 Sagamore Hill Dr., Port Washington, L. I., N. Y.

For more information circle 483 on inquiry card.

MILITARY AUTOMATION

PISTON CAPACITOR KITS

New piston capacitor kits, including 4 to 9 trimmer capacitors designed for particular applications, are housed in a styrene case complete with electrical characteristic charts: No. PK11 kit contains 5 glass and invar miniature trimmers for panel mounting. No. PK12 kit contains 5 miniature glass and invar trimmers for printed circuit applications. Also available are kits PK 13 to PK 17 inclusive.—*JFD Electronics Corp., 6101 Sixteenth Ave., Brooklyn 4, N. Y.*

For more information circle 484 on inquiry card.

SUBMIN CAPACITOR

New types 616G and 617G submin Mylar capacitors have full rating to 125°C. for 500 hrs. Insulation resistance is greater than 50,000 meg-ohm-microfarads at 25°C and temperature range from -55 to 125°C.



(to 150°C with 50% derating). Standard dc voltage ratings include 50, 150, 400, and 600 v. Temperature and immersion cycling, moisture resistance, and lead tests meet MIL-C-25A.—*Goodall Electric Mfg. Co., Ogallala, Neb.*

For more information circle 485 on inquiry card.

SWITCH MODIFICATION

New modification system of standard Daven rotary switch, with one pole per deck, allows switching 5 amp resistive, 115 v, ac or dc. Is available in shorting or non-shorting operation.—*The Daven Co., Livingston, N.J.*

For more information circle 486 on inquiry card.

PC COMMUTATION SWITCH

New Mycalex commutation switch, using printed circuit commutation plates made from Supramica 560F ceramoplastic, is designed for telemetry, sampling, data handling and



automatic control applications. Anticipated life is over 200 hours, depending on speed and type of service. Guaranteed for 100 hours at 600 rpm.—*Mycalex Electronics Corp., 125 Clifton Blvd., Clifton, N. J.*

For more information circle 487 on inquiry card.

SUPER HI-TEMP THERMAL SWITCH

New thermal switch for extremely high temperatures where very close temperature calibration is required with repeated operations has applications in jet engines, rocket motors,

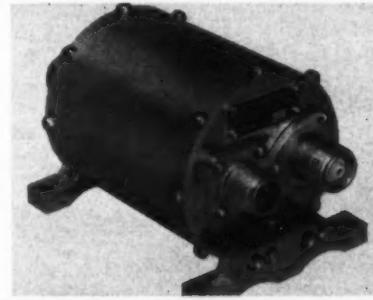


after-burner control, etc. Resistive rating is 1½ amp at 28 v dc, is easily installed and operates as low as -20° F with safe momentary overshoots to 2200° F.—*Control Products, Inc., 306 Sussex St., Harrison, N. J.*

For more information circle 488 on inquiry card.

HI POWER RF SWITCH

New Type 1696 pressurized RF switch will switch transmitter from one antenna to another under 100 watts RF while in severe missile, aircraft and ground environments.



Specs: Shock to 100 G; vibration 20 G to 2000 cps; temperature -40° to +250°F; frequency range, 215 to 250 mc; VSWR, 1.2 max; crosstalk, 27 db down into unused channel; sequence, make-before-break; 2½" x 4½" long, 2 lbs.—*Hycon Eastern, Inc., 75 Cambridge Pkwy., Cambridge 42, Mass.*

For more information circle 489 on inquiry card.

COMMUTATOR SWITCHES

New long-life motor-driven commutator switches are for use in telemetering, sampling and programming applications; have 500 hr minimum life and speeds from ½ to 30 rps. Circuits available are two independent

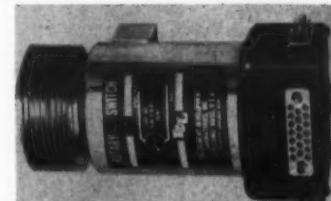


switch sections on Model TSC-50, and three independent switch sections on Model TSC-51. Drive motors operate on 115v, 400 cycles ac or 26.5v dc, 10-20 watts. Rated performance is achieved at temperatures to 85°C and vibration of 25 G to 2000 cps.—*Bendix Pacific Div., 11600 Sherman Way, No. Hollywood, Calif.*

For more information circle 490 on inquiry card.

SURVEILLANCE TYPE ROTARY SWITCH

New rotary switch for sampling data from radars, sonars and magnetometers has 3 poles, 16 non-shorting



contacts per pole, operating at 30 rps. Of the 16 positions, one carries reference frame voltage, the others sample the returned response of a 25° cone. Hermetically sealed, unit meets MIL-E-8189.—*Instrument Development Labs., Inc., 67 Mechanic St., Attleboro, Mass.*

For more information circle 491 on inquiry card.

SUB-MINIATURE SWITCH

New E4-134 Electro-Snap SPDT, snap-action switch for precision control in small space features small size,

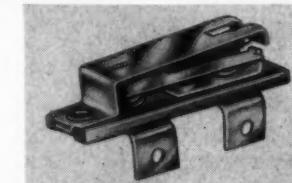


dimensional stability, precision and 1,000,000 ops mechanical life at 0.005" overtravel. Rated at 0.5 amps 125/250 v ac, 2.5 amps v dc with ambient temperature range of -65 to 250°F, it can be used individually or in bank assemblies.—*Electro-Snap Switch & Mfg. Co., 4218 W. Lake St., Chicago 24, Ill.*

For more information circle 492 on inquiry card.

SUB-MINIATURE BASIC SWITCH

New S70-00A series snap-action switch for printed circuit and remote control applications is rated at 6



amps, 125 v ac, SP, normally open. Uses 0.003" to 0.007" movement differential.—*Cherry Electrical Products Corp., 1650 Deerfield Rd., Highland Park, Ill.*

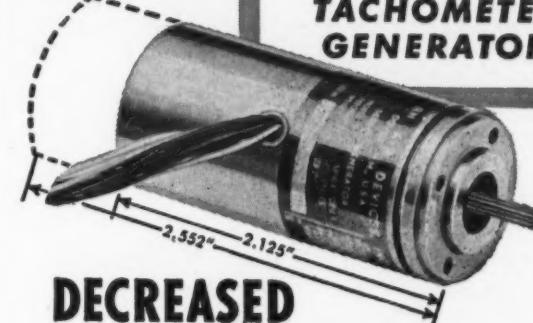
For more information circle 493 on inquiry card.

HI TEMP SWITCH

New SPDT switch, "V3-1301," for use on jet engines, rocket-powered missiles and electronic gear, is shock, humidity and radiation resistant and withstands heat to 600°F. Electrical rating is 10 amp at 125 or 250 vac; ½ amp at 125 vdc, ¼ amp at 250 vdc. At 30 vdc inductive rating is 10 amp at sea level, 6 amp at 50,000'; 30 vdc resistive rating is 10 amp.—*Micro Switch, Div. of Minneapolis-Honeywell, Freeport, Ill.*

For more information circle 494 on inquiry card.

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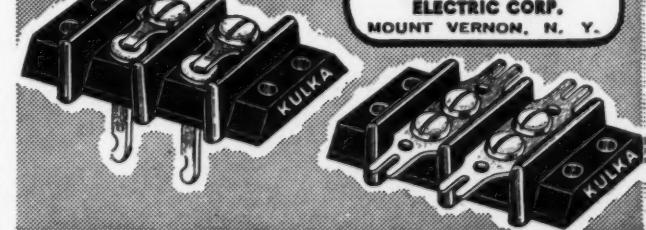
For more information circle 28 on inquiry card.

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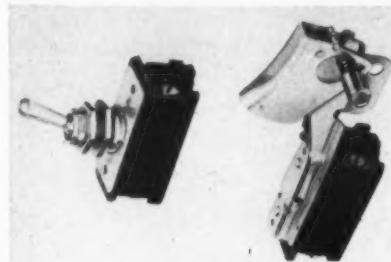
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TRIGGER SWITCHES

New 3000 Series toggle and trigger switches designed for small motor



applications emphasize sturdiness, reliability and long life.—*Sargent Electric Corp.*, 630 Merrick Rd., Lynbrook, N. Y.

For more information circle 495 on inquiry card.

TEMPERATURE-COMPENSATING BREAKER

New Klixon D6752-5 thermal type circuit breaker, designed to compensate for ambient temperature, trips at not more than 138% of rated current at 250°F, 138% at 77°F, and 160%

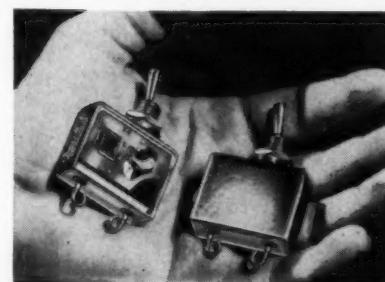


at -60°F. Has life of approx. 10,000 cycles, and high rupture capacity of at least 2500 amps 400 cycles, 115/200 v ac and 6000 amps, 28 v dc.—*Spencer Thermostat Div., Metals and Controls Corp.*, Attleboro, Mass.

For more information circle 496 on inquiry card.

SUB-MIN BREAKER

New Model SM3 hermetically-sealed, sub-miniature breaker combines magnetic actuation with hydraulic time delay. Available in rat-



ings from 50 ma to 10 amp, it is designed for operation at 110 v, 60 or 400 cycles, or 50 v dc. Breaker maintains its 125% must-trip point from -65° to 125°C with no derating for temperature or vibration.—*Heinemann Electric Co.*, 551 Plum St., Trenton 2, N. J.

For more information circle 497 on inquiry card.

LABORATORY AND TEST EQUIPMENT

ANTENNA PATTERN RECORDERS

New Model 121B Rectangular Antenna Pattern Recorders offer accuracy, faster pen and chart response speeds, and new high "plug-in" bal-

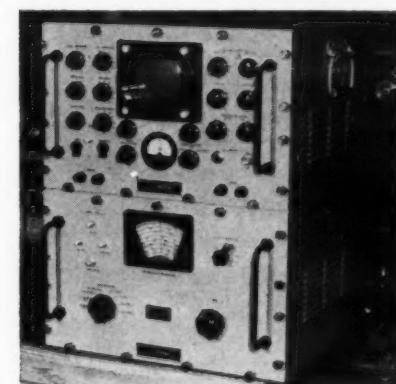


ance potentiometers for selecting linear, logarithmic or square-root pen responses. Companion series 122B Polar Antenna Pattern Recorders also incorporate same improvements.—*Scientific-Atlanta, Inc.*, 2162 Piedmont Rd., N. E., Atlanta, Ga.

For more information circle 498 on inquiry card.

PRECISION SPECTRUM ANALYZER

New precision no-klystron spectrum analyzer permits rapid observation of signals over the 10 to 21,000 mc range. Single tuning head precludes



misplacing expensive tuning units, and triple shielding allows operation in fields exceeding 4 megawatts without spurious responses. Has shock performance of 37 G, 10 msec duration in transit case, vibration of 10-55 cps, 10 G, and meets environmental specifications.—*Lavoie Labs. Inc.*, Matawan-Freehold Rd., Morganville, N. J.

For more information circle 499 on inquiry card.

RADIATION DETECTOR

New UAC-700 transistorized survey meter can be used to measure low-level

radiation in industrial laboratories, hospitals, reactor installations and isotope applications. Uses a transistorized, printed circuit, low battery input, it weighs only 4½ lbs, and operates over 250 consecutive hours on one set of three 1½-v flashlight cells. Large linear-scale meter calibrated in



mr/hr and counts-per-minute has sensitivity range from 0.5 mr/hr to 50.0 mr/hr. Meets government specifications for humidity, atmospheric pressure, shock and vibration.—Universal Transistor Prod. Corp., 143 E. 49th St., New York 17, N. Y.

For more information circle 500 on inquiry card.

MISSILE CHECK POWER

New 60-to-400 cycle portable-power motogenerator set is designed to operate from any standard commercial 60-cycle source and to supply 400-cycle ac preflight power for guided



missiles and checkout trailers. Also suitable for high-cycle tool operation and aeronautical equipment testing.—Kato Eng. Co., Dept. 180D, Mankato, Minn.

For more information circle 501 on inquiry card.

SIMULATED AERODYNAMIC HEATING

Programmed heat lamps, used to reproduce missile reentry heating ef-



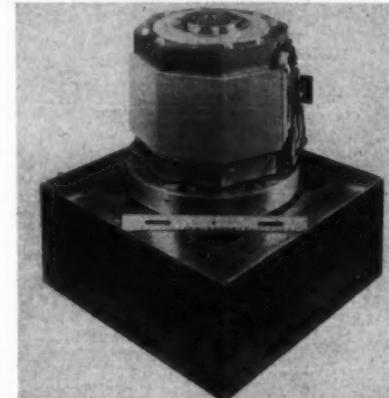
fects, are controlled by an analog computer (illustrated) that "reads" hand-drawn curves which represent recovery temperature and heat transfer coefficient. This "flight path data" is combined by the computer with the actual surface temperature measured

by a thermocouple; it then computes the required power input, and regulates power to the heating lamps through an ignitron power controller. Over 50 kw/sq ft of radiant energy is precisely scheduled by this method.—Research, Inc., 115 N. Buchanan St., Hopkins, Minn.

For more information circle 502 on inquiry card.

VIBRATION TESTER

New "Hydrashaker," a high-force, high-frequency vibration test machine employs electronically controlled hydraulic power adapted to customer's test requirements. Navy ship model has 45,000-lb block force that simulates vibrations on an operational



ship; aircraft model has 20,000-lb block force and simulates high-speed air environment for air component tests. Small force absorption of its light moving assembly gives greater rated force capacity than machines having heavier moving assemblies.—Wyle Assocs., 128 Maryland St., El Segundo, Calif.

For more information circle 503 on inquiry card.

ANTENNA SILENCERS

New Eccosorb Caps, used to cover a radiating antenna to confine the radiated energy within the cap and to terminate the antenna in essentially free space conditions, have a Type N bulkhead connector so probe can be attached internally to monitor anten-



na output. Can be supplied to cover frequency range from 200 mc to 30,000 mc with significant broadbanding in a single cap feasible. Power-handling ability as high as 1 kw average power; VSWR in typical application is 1.1.—Emerson & Cuming, Inc., 869 Washington St., Canton, Mass.

For more information circle 504 on inquiry card.

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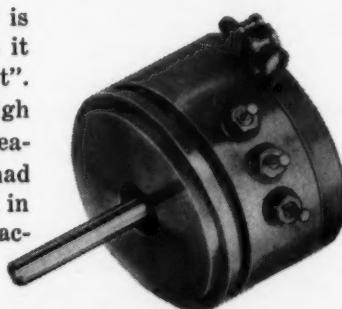
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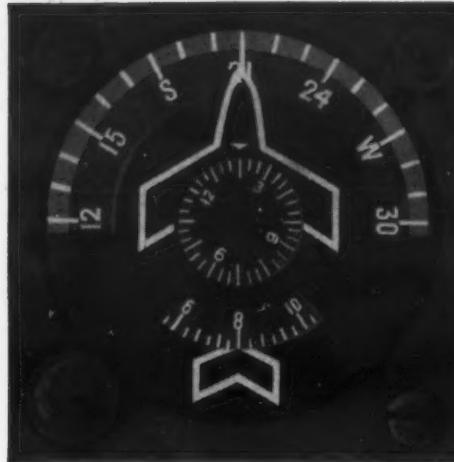
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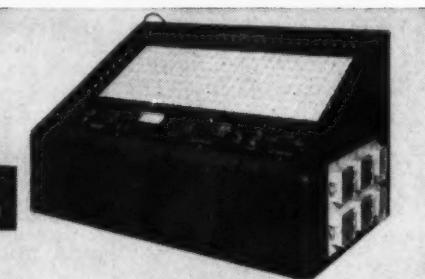
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For more information circle 32 on inquiry card.

New Products—Cont.

MARINE RECORDER

New Model SL-4M Marine Level Recorder for frequency response, sound, noise, and vibration measurements under marine and tropical operating conditions is also suited for

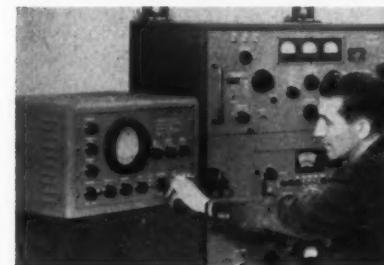


general laboratory use. Features recording mechanism ruggedness (electrodynamic), non-corrosive materials and oilite and Teflon bearings.—Sound Apparatus Co., Stirling, N. J.

For more information circle 507 on inquiry card.

SPEEDS SSB ANALYSIS

New Model SB-12a Panalyzor, specifically designed for single-sideband transmitter analysis (see illustration), enables rapid visual analysis



of dynamic transmission band occupancy, non-linearities, residual carrier and suppressed side band levels, as well as out-of-band radiations. Has 60 db range and fewer control settings.—Panoramic Radio Products, Inc., 514 So. Fulton Ave., Mount Vernon, N. Y.

For more information circle 506 on inquiry card.

AF SUBSTITUTION ATTENUATOR

New model CF-1 attenuator is designed for measuring RF power ratios in systems using modulated RF power sources and square-law RF detectors. Because the audio voltage output from the detector is pro-



portional to the RF power input, it is necessary to substitute audio attenuation equal to two times the change in RF attenuation. The CF-1 audio attenuator reads, in decibels,

the change in RF attenuation from 0-52db; has a characteristic impedance of 2000 ohms. A high input impedance linear cathode follower drives attenuator, which is terminated internally and is designed for use with a moderately high impedance output indicator.—Weinschel Engineering, 10503 Metropolitan Ave., Kensington, Md.

For more information circle 507 on inquiry card.

CAPACITANCE PROBE TESTER

New capacitance probe tester MD-2A is designed per ASG Spec MIL-T-4687B for trouble-shooting liquid quantity gage systems employing capacitance type sensing probes. Measures electrostatic capacitance and electrical insulation resistance direct-

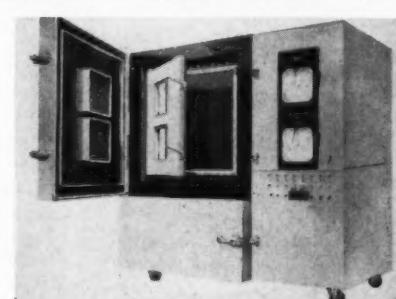


ly, without use of external bridges, precision condensers, or other supporting equipment. Capacitance range is 0 to 5000 μf in 4 scale ranges. Resistance range is from 0 to 10,000 meg, in 4 scale ranges, with accuracy 0.25% of full scale or 0.5% of individual reading.—Consolidated Airborne Systems, Inc., 321 Willis Ave., Mineola, N. Y.

For more information circle 508 on inquiry card.

ALTITUDE-TEMPERATURE TEST SYSTEM

New combination test system Model ATICO-27 provides a 27 cu ft altitude chamber (to 200,000') nesting into a 53 cu ft hi-lo temperature chamber. Removal of altitude chamber leaves



the hi-lo temperature chamber (-100° to 400°F). Separated, the two chambers can be operated simultaneously or independently. Standard equipment includes vacuum system; thermostatically controlled cooling system using dry ice or liquid CO₂; heating element; fan air circulation system.—Mantec, Inc., 126 Maryland St., El Segundo, Calif.

For more information circle 509 on inquiry card.

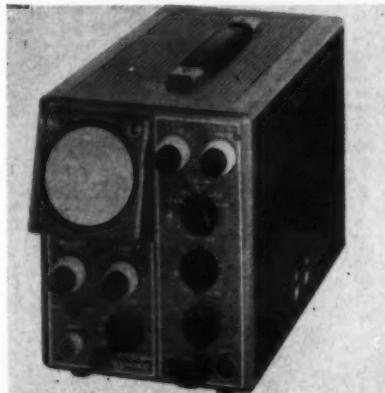
TRANSISTOR TESTER

New Model TT-205 Sonex transistor tester for lab or field use measures small signal beta, collector leakage current, and collector resistance on all NPN, PNP, surface barrier, grown or diffused junction transistors. Eleven voltage-current operating points are provided with one selector switch and each transistor under test is operated in a temperature stabilized circuit, insuring identical biasing conditions. Unit is powered by one battery with low current drain.—Sonex Inc., 73 South State Rd., Upper Darby, Penna.

For more information circle 510 on inquiry card.

PORTABLE SCOPE

New Type TS 301 with balanced, de-coupled amplifiers giving flat re-

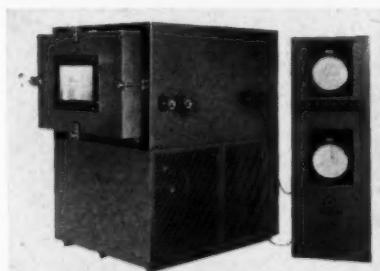


sponse to 6 mc (-3 db) and rise time of better than 0.06 μ sec. for less than 2% overshoot, has automatic sync and precision trigger level selection and TV field and frame sync selectors. Built-in voltage and time calibrating signals facilitate quantitative measurements and X-expansion gives a 50 cm effective trace length on 3" tube. Eighteen preset calibrated sweep speeds and frequency-corrected attenuator permit time and voltage measurement over the ranges 0.1 μ sec/cm to 0.5 sec/cm and from 20 mv to 250v, ac or dc. Weighs only 16 lbs.—The Scopes Co. Inc., 511 Victor St., Saddlebrook, N. J.

For more information circle 511 on inquiry card.

ALTITUDE CHAMBER

New 12 cu ft environmental altitude chamber simulates altitudes from



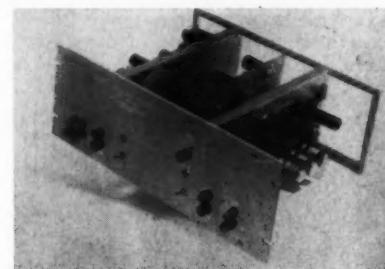
sea level to 50,000' in 6 min., to 80,000' in 20 min.; pull down from ambient (+80°F) to -100°F in 50

min. Reserve refrigeration capacity maintains -100°F with a 500 w electrical input at 50,000' altitude. Refrigeration units water cooled with automatic water regulating valve. Heating elements can raise temp. from ambient (+80°F) to +250°F in 25 min. Humidity 20% to 98% accomplished by Webber miscible vapor and atmospheric arrangement. Air circulation assures maximum transfer of heat and zero stratification. Instrumentation mounted on separate console consists of dual wet and dry bulb, 2-pen 12" circular chart recorder and controller.—Webber Corp., AC-469, P. O. Box 217, Indianapolis, Ind.

For more information circle 512 on inquiry card.

AUDIO VOLTAGE STANDARD

New Model AVS-320 regulator unit for AF voltage control is equivalent to an AC standard cell. Accurate, reliable in operation; provides output of 1-10-100-300v rms; frequency 30

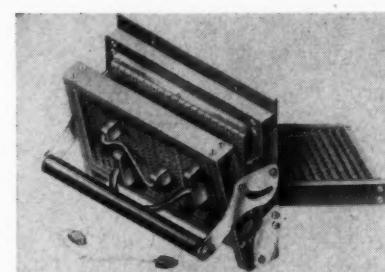


cycles to 20 kc; input voltage of 1v rms; output regulation of plus 0.1% for a period of 30 days, with distortion of less than 0.025%; operates from 105 to 125v 60 cycles; 150 watts.—Holt Inst. Labs., Oconto, Wis.

For more information circle 513 on inquiry card.

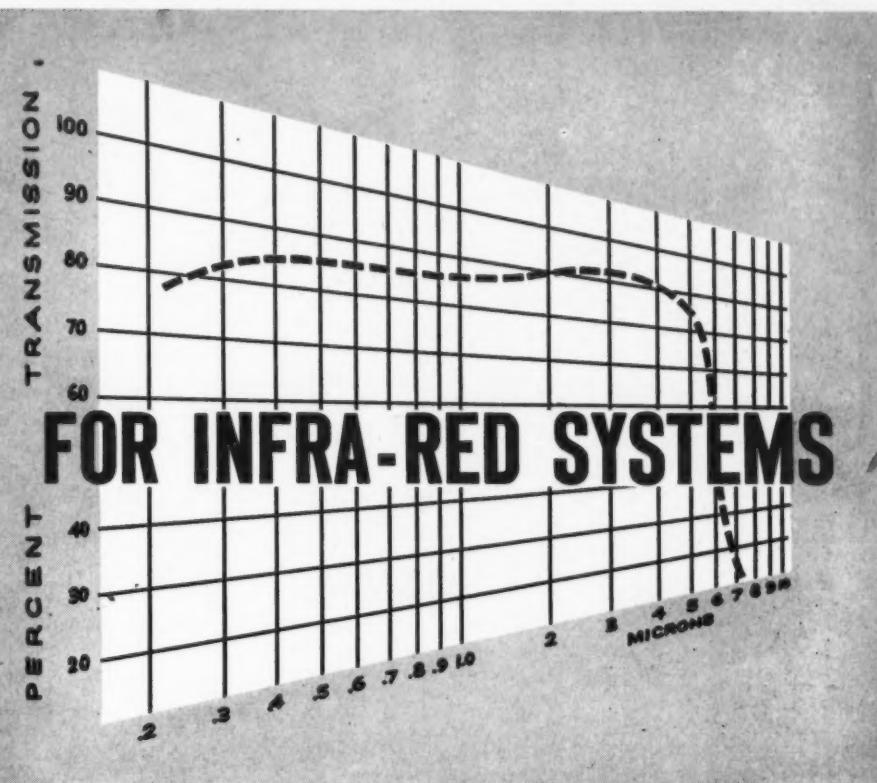
PATCHCORD PROGRAMMER

New VELCO Patchcord Programming System, for use with analog and digital computers, telemetering systems, automatic test equipment, and systems of automation which require



rapid change programming, is compact and flexible. Flexibility results from modular arrangement of contact strips and use of either single or multiple patchcords (max. of 22 conductors) for programming purposes. Virginia Electronics Co., Inc., River Rd. & B & O Railroad, Washington 16, D. C.

For more information circle 514 on inquiry card.



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Model AGC

SPECIFICATIONS

Number of decks—1-4 • Speed regulation— $\pm 1.0\%$ at 50% voltage shift
Size— $1\frac{1}{4}'' \times 2\frac{1}{4}''$ —depth depends on number of decks
Segments per deck—2-8 for stock units.
Special commutators to order for a nominal tool charge.
Shorting or non-shorting contact • Power input—.008 Amp. at 6 VDC

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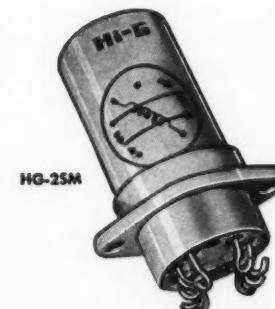
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SUB FRACTIONAL WATT D.C. MOTORS

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SIGNALLING SYSTEM COMPONENT

For more information circle 34 on inquiry card.

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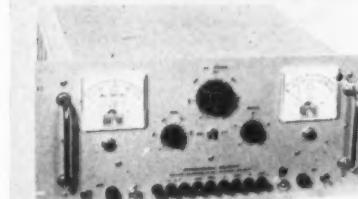


BRADLEY FIELD WINDSOR LOCKS, CONN.

For more information circle 35 on inquiry card.

REMOTELY PROGRAMMABLE POWER

New model 236A supply with programmable output capable of furnishing 200 ma at any voltage between 0 and 600 vdc also provides a 0-150 vdc, 5 ma bias supply and a 6.3 vac

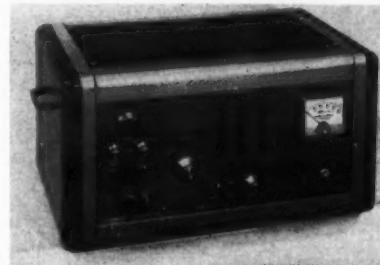


CT, 10 amp filament supply. For each 500 ohms shunted across the remote programming line the high-voltage output furnishes one volt. Resistance may be varied continuously or in steps.—*Electronic Measurements Co., Inc., Eatontown, N.J.*

For more information circle 515 on inquiry card.

PLUG-IN SCALER/RATEMETER

New model PFA-100 includes built-in timer; voltage for probe with $\frac{1}{2}\%$ regulation, variable from 500 to 2500v; self-contained calibrator; her-



metically sealed transformers; and connection for 1-ma pen recorder. Counting unit can be either a high speed decade scaler or wide range ratemeter with aural monitor.—*Nuclear Electronics Corp., 2632 W. Cumberland St., Philadelphia 32, Pa.*

For more information circle 516 on inquiry card.

12-KV POWER SUPPLY

New model PS12-T 12-kv power supply features an oilfilled, hermetically sealed unit incorporating a full-wave voltage-doubler circuit using IB3-6T tubes. Delivers variable out-

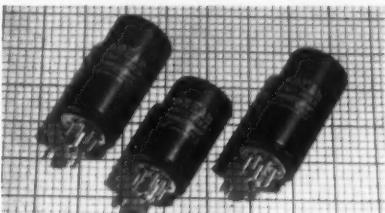


put up to 12,000 vdc at 1 ma and up to 1.75 ma at 11,500 v for short periods. Regulation from no-load to full-load is close to 7%. Output ripple is 0.75% max. at rated 60 cycle output. Supply also can be used for 400-cps operation, with output and current remaining the same, but with ripple greatly reduced. Case measures $3\frac{3}{4}'' \times 4\frac{1}{16}'' \times 8''$.—*Film Capacitors, Inc., 3400 Park Ave., New York 56, N.Y.*

For more information circle 517 on inquiry card.

LOW-LEVEL MAGAMPS

New Preac high-sensitivity magnetic preamplifiers for data sensors (thermocouples, strain gauges, bolometers and electrometers) provide 4 v output into 5000 ohm loads from inputs as low as 0.0026 μ watts with null drifts of less than 0.1 μ amp. Op-

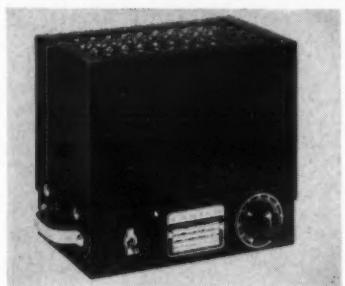


erates from 400 (± 40) cps, 115 (± 11) v rms power, accepting dc polarity reversible input signals and delivering unfiltered dc polarity reversible outputs.—*Airpax Products Co., Seminole Div., Ft. Lauderdale, Fla.*

For more information circle 518 on inquiry card.

60-CYCLES FROM ANY INPUT

New Carter Change-A-Cycle Frequency Changer rectifies any ac input to dc to drive a special Carter dc-to-



ac converter, 60 or 50-cycle output, as specified. Either single-phase or 3-phase input are available.—*Carter Motor Co., 2707A W. George St., Chicago 18, Ill.*

For more information circle 519 on inquiry card.

SLOTTED LINE

New Type 200 PRD $\frac{7}{8}$ " coaxial 50-ohm slotted sections use large LT connectors and RG-117 cable for measurement of VSWR and phase in high-



power CW or pulsed systems in 1000 to 5000 mc range. Residual VSWR is less than 1.04 up to 4000 mc, and less than 1.06 up to 5000 mc.—*Polytechnic Research and Development Co., Inc., 202 Tillary St., Brooklyn 1, N.Y.*

For more information circle 520 on inquiry card.

HYDRAULIC PUMP

New variable delivery, variable pressure, hydraulic pump capable of pressures to 5000 psi meets MIL-S-26874 and 26877 for aircraft hydraulic test stand use, missile launching, jet engine starters, plane check-out stands, plane maneuvering equip-

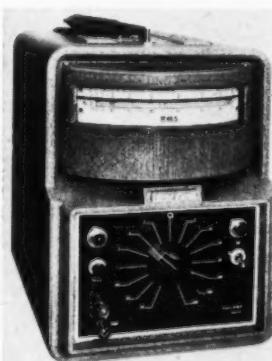


ment, and mobile shop or hangar equipment. Designed to deliver 38.2 gpm at 3750 rpm and 3000 psi; minimum life is approx 1335 hrs. At 5000 psi and 3750 rpm, delivery is about 38.2 gpm with minimum life of approx 288 hrs.—*Vickers Inc., 1400 Oakman Blvd., Detroit 32, Mich.*

For more information circle 521 on inquiry card.

HIGH ACCURACY RMS VTVM

New Model 120-1 VTVM measures true rms voltage from 0.002 to 500 vrms with an accuracy of $\frac{1}{4}\%$ of



full scale because meter deflection is always proportional to the square of the current through the dynamometer meter movement. Errors of average- and peak-reading instruments and variations of harmonic shift are avoided.—*Trio Laboratories, Inc., Seaford, N. Y.*

For more information circle 522 on inquiry card.

TARGET SIMULATOR

New Model RP175 "Radar Pulse Programmer" simulates radar target characteristics for laboratory eval-

uation or field testing of radars and associated computers, etc. The unit will program a target over a range of 30 nautical miles at velocities from 0 to 5,000 fpm and accelerate the target range position from 0 to 30 G's.

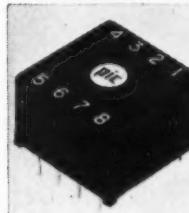


It may be externally triggered or operated internally over a PRF range of 400 to 2,000 pps. Target pulse width is adjustable from 0.2 to 1.0 μ sec and amplitude modulated up to 1000 cps.—*Remanco, 128 Broadway, Santa Monica, Calif.*

For more information circle 523 on inquiry card.

PRINTED CIRCUIT COMPONENT

New PIC type BA pulse transformers designed for printed-circuit and automatic-assembly techniques feature: Plug in terminals arranged on 0.1" multiple grid spacing; keyed units for automatic insertion ma-



chinery; four feet provide board clearance to eliminate condensation; and epoxy encapsulation in $1\frac{1}{16}$ " square x $\frac{1}{2}$ " plastic case, meeting MIL-T-27A and 21038.—*Polyphase Instrument Co., East Fourth St., Bridgeport, Penna.*

For more information circle 524 on inquiry card.

NAVIGATIONAL STOP WATCH

New 18-Jewel Navigational stop watch and chronograph, conforming to MIL-W-5605; AN 5742-1, operates in extreme hot and cold temperatures with deviations of fractions of sec-



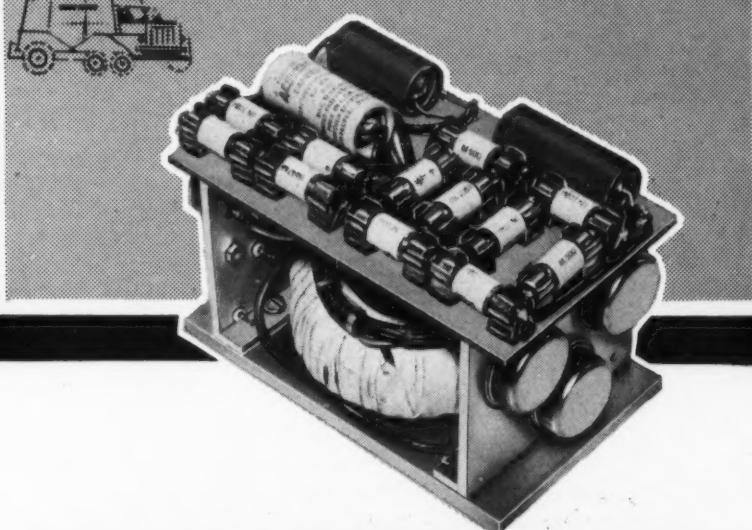
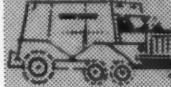
onds. Model 605A combines features of a timepiece and chronograph with sweep second hand indicating $\frac{1}{60}$ seconds, completing one turn of dial in 60 seconds.—*Wakmann Watch Co., Inc., 15 W. 47th St., New York, N. Y.*

For more information circle 525 on inquiry card.

NOW! PROVEN

RELIABILITY*

REPLACES BULKY, INEFFICIENT DYNAMOTORS



UNIVERSAL transistorized DC TRANSFORMERS

Designers of much of today's important new electronic equipment for mobile, aircraft and marine applications specify Universal Transistorized DC Transformers because they are efficient, compact, rugged improvements on dynamotors. They reduce operating and maintenance costs because there are no moving parts, no wear, no tear, and no brush interference.

*For leaders such as Bendix Radio, Dumont, General Electric, RCA, Sperry Products and Western Electric, UAC power supplies' high transistor reliability (to 95% in 10,000 hrs. use), low maintenance . . . minimum size and weight . . . long life . . . and efficiency as high as 98% . . . are paying important dividends.

Whatever your power engineering problem, Universal has the unit to outlast and outpower conventional supplies by far.

PERFORMANCE CHARACTERISTICS

EFFICIENCY: As high as 98%

SIZE: As small as $\frac{1}{4}$ cu. in. per watt

WEIGHT: As light as $\frac{1}{2}$ oz. per watt

INPUTS: 6-110VDC

OUTPUTS: to 2000 watts

REGULATION: to $\pm 0.1\%$



UAC Electronics

A DIVISION OF

UNIVERSAL
Transistor Products Corp.

Dept. M4 • 17 Brooklyn Ave., Westbury, L. I., N. Y. • EDgewood 3-3304 • Cable: Univatoms

IN CANADA — ELECTRONIC ENTERPRISES REGD. 551 OAKWOOD AVE., TORONTO 10, ONT.

For more information circle 36 on inquiry card.

One Hundred Millionth Of A Second Shutter

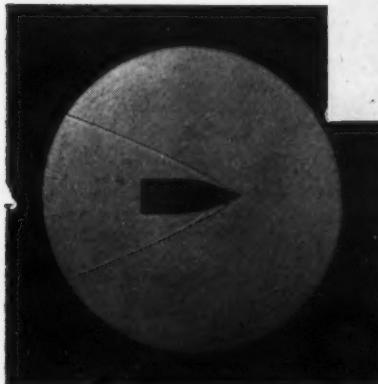
New version of the Kerr cell uses an improved pulse generating circuit and a filling of nitrobenzene to achieve ultra-fast test camera exposures.

The cell is a simple glass box with flat electrodes on the sides, optically flat at each end. When filled with nitrobenzene and fitted with a Polaroid filter at each end, the cell is practically opaque when the two filters have their axes "crossed". This is because light polarized by the first filter is absorbed by the second.

When an electric pulse hits the electrodes, the electric field rotates the polarization of the light beam as it passes through the nitrobenzene, allowing it to pass through the second filter without absorption. The chief use of the Avco Kerr cell is in the company's research on the nose cone of the Air Force Titan ICBM. However, important uses for the Kerr cell camera are seen in other high-speed research applications.

The pulsing circuit, consisting of a capacitor discharging through a thyratron into the primary of a

KERR CELL (right) uses filling of nitrobenzene and 75 kv pulse to



achieve ultra-short exposures (left) needed in missile tests.

35:1 step-up pulse transformer triggers a simple pulse generator, consisting of a spark gap and a RG8/U cable transmission line. The Kerr cell is connected directly across the load resistor on the line and does not require an impedance matching transformer. A pulse of 50 to 75 kv is delivered to the cell plates.

The effective aperture of the Avco Kerr cell is about $f/10$. The characteristics of the polarizing material limit the incident light angle to within 10° from normal, accounting for an initial limit of $f/2.5$, and absorption loss in the shutter decreases the speed about four more $f/$ stops.

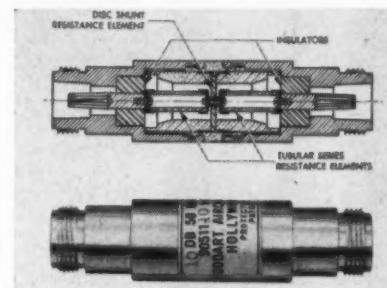
The cell is a development of the Avco Research and Advanced Development Div., 20 S. Union St., Lawrence, Mass.

For more information circle 320 on inquiry card.

New Products—Cont.

ATTENUATOR WITHSTANDS 400° F

New coaxial attenuators use thin platinum films on ceramic forms to withstand internal temperatures as high as 400°F (possibly attained at 3 times rated dissipation of 1

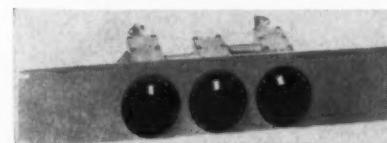


watt). Overall length about 3", surge impedance is 50 ohms, and attenuations of 0.1 db through 60 db are available with an accuracy of ± 0.5 db.—*Stoddart Aircraft Radio Co., Inc.*, 6644 Santa Monica Blvd., Hollywood 38, Calif.

For more information circle 526 on inquiry card.

RF ATTENUATORS

New VA variable RF attenuators operating from dc to above 250 mc have VSWR at 100 mc of less than 1.01. Single rotating units are avail-



able at 0.1, 1 or 10 db per step, with maximum change in loss from 0 to 100 mc of 0.1 db.—*Ortho Filter Corp.*, 196 Albion Ave., Paterson 2, N. J.

For more information circle 527 on inquiry card.

SERVOS AND COMPUTERS

MISSILE SIZE 11 SYNCHROS

New Size 11 Synchros perform reliably and accurately in corrosive en-



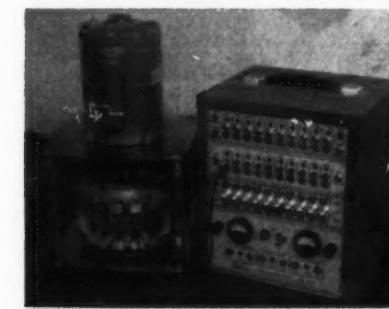
vironments (stainless steel housing, shafts and bearings coupled with corrosive resistant lamination materials

assure performance), high temperature accuracy is maintained within 10 minutes from electrical zero over temperature range of -54° to 200° C, vibration (performs within specs under 20 G, 20 to 2000 cps), and after shock of 50 G.—*Kearfott Co., Inc.*, 1378 Main Ave., Clifton, N. J.

For more information circle 528 on inquiry card.

MEMORY TESTER

New read-write test system for magnetic tape or drum memories contains (1) a 10-bit shift register for parallel-to-serial conversion of incoming data or serial-to-parallel conversion of outgoing data, (2) a 10-channel NRZ write-amplifier, (3) a 10-

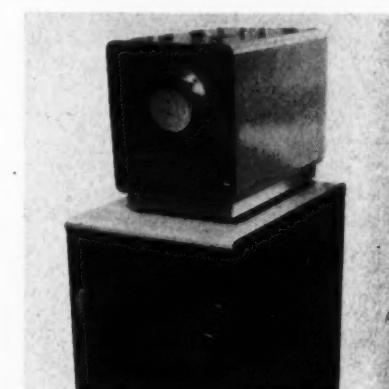


channel NRZ read-amplifier, and (4) a regulated power supply. Units are entirely transistorized, use printed circuits and are compatible with other NAVCOR Transistorized Pulse Programming Equipment. Will combine with over 40 functional units for digital data processing and data storage.—*Navigation Computer Corp.*, 1621 Snyder Ave., Phila. 45, Pa.

For more information circle 529 on inquiry card.

READOUT GENERATOR AND VIEWER

New SM-Generator and Viewer using Hughes Memotron tube converts coded data into written word viewing or to photograph for permanent rec-



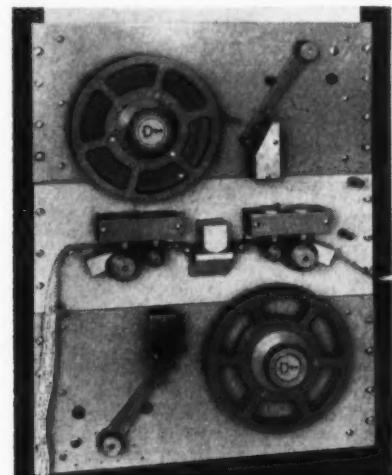
ord. Generates and portrays alphabets of all languages, Arabic numerals, arbitrary or abstract symbols at display rate of 10,000 characters per second. Up to 150 different characters can be generated by symbol matrix. Viewer displays 200 characters at one time (20 per line in 10

lines) and can be held indefinitely until erased. Input is five-, six-, or seven-bit coded data, parallel by bit, serial by character. Output is any symbol or character which can be formed on five-column seven-row dot matrix.—*Laboratory for Electronics, Inc.*, 141 Malden St., Boston 18, Mass.

For more information circle 530 on inquiry card.

PAPER TAPE READER

New Dykor Paper Tape Reader provides strip and reel feed in one unit. Tape is set in motion when a solenoid operates a pressure roller to squeeze the tape against a continuously-rotating capstan. Two oppositely-rotating



capstans allow tape to be driven in either direction, with starting time less than 5 msec. By using reverse feed control, programs requiring repeat feedings proceed rapidly. Standard 5, 6, 7, or 8 level tapes (plus sprocket hole) are handled and $\frac{1}{8}$ ", $\frac{1}{4}$ " or 1" wide tapes can be used interchangeably. Fast reading is achieved by photoelectric sensing which uses Silicon photocells.—*Digitecronics Corp.*, Albertson Ave., Albertson, L. I., N. Y.

For more information circle 531 on inquiry card.

MIN 60-CYCLE SERVO

New size 11, 60 cycle miniature servo motor, 1.062" dia, develops stall torque of 1.0 oz-in, with max. acceleration at stall of 59,000 radian/sec². Moment of inertia is 1.2 g-cm²



and time constant is 0.0057 sec. Control phase of motor may be wound for direct transistor drive. Available as a unit, or as servo assembly combining synchros, amplifiers, gear trains, slip clutches, etc.—*Daystrom Transicoil Corp.*, Worcester, Montgomery Co., Pa.

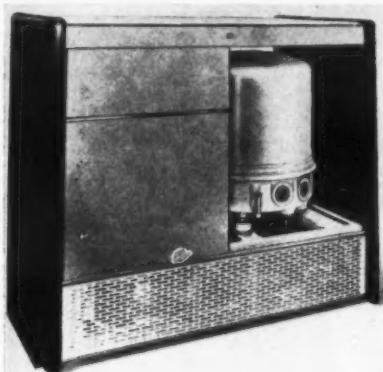
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MAGNETIC BULK STORAGE

New HD-FILE DRUM is random access bulk storage device which stores 1040 bits per inch, has 320 tracks (20 tracks are spares), and stores a total of 15 million bits. Access time to stored data is 180 milliseconds.



(average). Consists of file drum, drive and lubrication systems, a 3 x 10 x 10 track-selection mercury relay matrix, linear read-out preamplifier, and final writing amplifier. File drum (15" x 14" high) is completely enclosed and sealed.—*Laboratory for Electronics, Inc., 141 Malden St., Boston 18, Mass.*

For more information circle 533 on inquiry card.

SERVO SHAFT HANGERS

New precision component and shaft hangers are designed for servo and for prototype and production applications. Single and double bearing type



hangers for $\frac{1}{4}$ " and $\frac{1}{8}$ " shafts, and blank hangers for mounting non-standard components can be supplied.—*Reeves Instrument Corp., 207 E. 91st St., New York 28, N. Y.*

For more information circle 534 on inquiry card.

PACKAGED SERVO COMPONENT

New Servopot packaged servo component consists of an integral combination of a two-phase instrument servo-motor, gear reduction, slip clutch and precision potentiometer. Is designed for balancing, positioning and computing servomechanisms. Addition of an integrally mounted ac tachometer with 0.5% linearity makes the Servopot a complete integrating servo. Standard pots feature 0.5% linearity and are available with resistances from 35 to 80,000 ohms, in single, multi-turn, and non-linear models.—*Diehl Mfg. Co., Finderne Plant, Somerville, N. J.*

For more information circle 535 on inquiry card.

SERVO MOTORS

New IMC 700 servo motors, size 8, feature high torque-to-inertia ratio with length of 1.062". Available for aircraft and missile applications with inputs 6 to 57 v, units operate over ambient range -55° to 125°C . Fre-

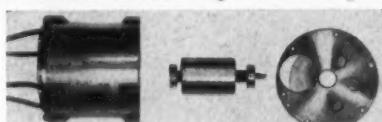


quency 400 cps; inertia 0.65 gm cm^2 ; max power output 0.45 w; theoretical acceleration measured at stall 32,600 rad/sec 2 ; units meet MIL-E-5272A.—*Induction Motors Corp., 570 Main St., Westbury, L. I., N. Y.*

For more information circle 536 on inquiry card.

HI TEMP SERVO MOTOR

New high temperature two-phase servo motor model 07-0001 for use in 600°F ambient air has continuous operation at 600°F air, 550°F jet fuel, per MIL-F25558. Input: fixed phase

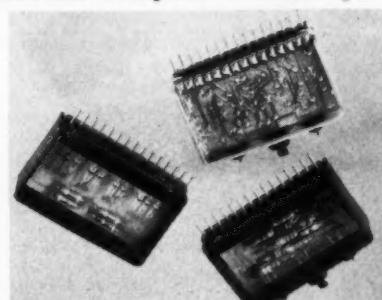


is 115v 400 cps; control phase is 0-115v 400 cps. Acceleration at stall at 75°F is 5380 rad/sec 2 ; at 600°F , 4500 rad/sec 2 . Other characteristics: Torque 150 oz in at 30 rpm at 550°F ; positional accuracy $\frac{1}{2}^{\circ}$, rotor moment of inertia 122 gm cm^2 , and vibration 15 G to 2 KC.—*Thompson Products, Inc., 2196 Clarkwood Rd., Cleveland 3, Ohio.*

For more information circle 537 on inquiry card.

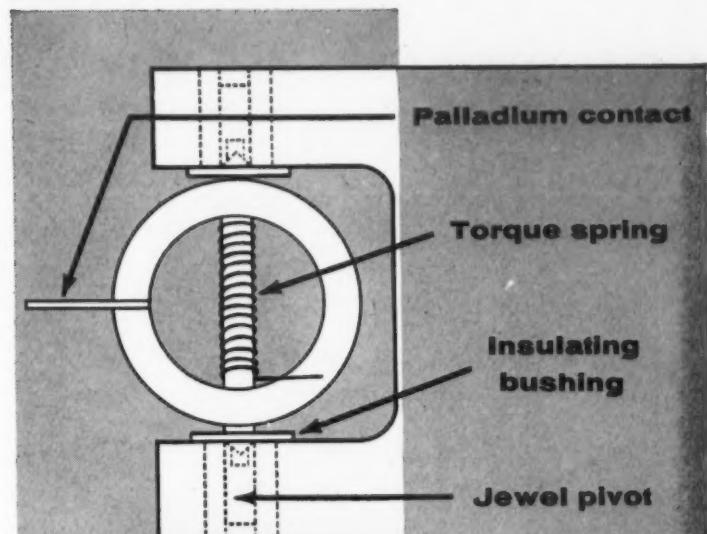
TRANSISTORIZED "BUILDING BLOCKS"

New "transistorized logical building blocks" simplify design and greatly reduce size of high-speed electronic computers. Plug-in units ($2\frac{1}{2}'' \times 2\frac{1}{2}'' \times \frac{1}{2}''$ thick) make possible design of desk-size computers which operate



without air conditioning systems in ambients from -58° to 185°F ; include eight basic varieties to enable computer designer to work directly from equations to desired circuit.—*Avco Research and Advanced Development Div., 20 S. Union St., Lawrence, Mass.*

For more information circle 538 on inquiry card.



2,000
CYCLE
VIBRATION!

Now a totally different mechanical design overcomes limitations of conventional precision potentiometers. The heart of the matter is "dynamic balance" — (1) arm dynamically balanced on shaft (2) contact assembly dynamically balanced on arm. Advantages: low mass, low inertia, long life, .1% linearity, exceptional stability under extremes of vibration, shock and acceleration.

another result of
"dynamic
balance"*

"Dynamic Balance" . . . it's the very essence of the "1000 series" of linear and functional precision potentiometers. It means a new dimension in circuitry design! Proved operationally successful in a variety of military equipments even under severe environmental conditions, "1000 series" pots open the way to reliable electronic systems withstanding higher frequencies and temperatures.

Get complete engineering data on the "1000 series" line. Write today.

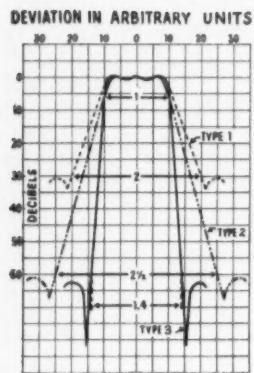
kintronic

Division of
Chicago Aerial Industries, Inc.

10265 Franklin Avenue • Franklin Park, Illinois

For more information circle 37 on inquiry card.

L-C Elements Combined With Crystals In New Filters

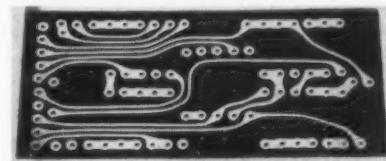


Crystal filter elements are being used separately or combined with Toroidal L-C units to meet new requirements which could be solved only with great difficulty with L-C filters alone. Crystal filters may be divided into two main classes: The first, using crystals only, may have a bandwidth extending from 0.01% to 0.55%, for frequencies up to 500 kc. The second uses crystal elements in combination with toroidal coils to produce bandwidths from 1% to 10% up to 500 kc, and up to 6% for filters in the megacycle range. In an attempt to simplify the use of crystal filters, Burnell & Co. has engineered standard designs that are available for both narrow and wide-band usage, thus precluding high development costs. Types 1, 2, and 3 indicate increasing order of complexity of wide-band filter design. (From 4-page bulletin XT-455, "Crystal Filters," by Burnell & Co., Inc., 10 Pelham Pkwy., Pelham Manor, N. Y.)

For more information circle 321 on inquiry card.

COPPER-METALLIZED BOARDS

New printed circuit boards of Fotoceram, chemically machinable glass capable of continuous operation at 250°C, feature through-hole plating



and ability to withstand high solder-pot temperatures. Boards for missiles, control and measuring instruments, radar and other high-reliability units are now available in commercial quantities.—Corning Glass Works, Corning, N. Y.

For more information circle 539 on inquiry card.

MINIATURE CONNECTOR COUPLER

New Model DM9718-19S miniature connector has coupling ring to permit use of gloves for installation and dis-



connection by providing a larger gripping surface.—The Deutsch Co., 7000 Avalon Blvd., Los Angeles 3, Calif.

For more information circle 540 on inquiry card.

PRINTED CIRCUIT CONNECTORS

New "Bellows Action" contacts for printed circuit connectors in bifurcated construction provides a redundant circuit with two independent

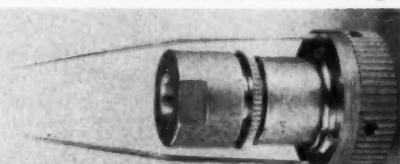


spring leaf contact actions for greater reliability.—DeJur-Amsco Corp., 45-01 Northern Blvd., Long Island City 1, N. Y.

For more information circle 541 on inquiry card.

REMOVABLE LANYARD CONNECTOR

New miniature electrical connector Model DM9714-3S, for missile use, provides three contacts and has spe-

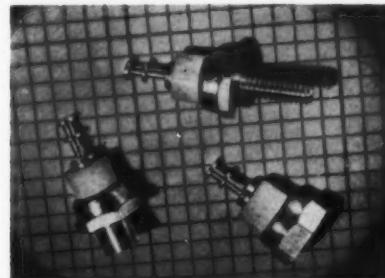


cial coupling ring permitting use of removable lanyard. Cable grommet is used on end of connector.—The Deutsch Co., 7000 Avalon Blvd., Los Angeles 3, Calif.

For more information circle 542 on inquiry card.

STANOFF TERMINALS

New insulated standoff terminal operates in the 1000°C region, demonstrates high impact strength, high resistivity at high temperatures, no

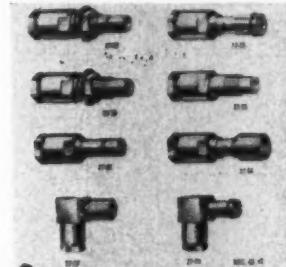


water absorption and high resistance to nuclear radiation due to the use of extremely high strength alumina insulator which withstands over 0.05 ft-lb impacts on IZOD type test.—Litton Industries Components Div., 5873 Rodeo Rd., Los Angeles 16, Calif.

For more information circle 543 on inquiry card.

SUBMIN RF CONNECTORS

New field-serviceable subminiature RF connectors feature easy assembly, anchored center contact, and improved cable clamp. 50-ohm plugs, jacks, bulkhead jacks and right angle plugs



are available in tubing size ranges I, II and III; has low ASTM brittle point of minus 100°F with max operating temperature of 185°F.—Irvington Div., Minnesota Mining & Mfg. Co., Irvington 11, N. J.

For more information circle 547 on inquiry card.

DUCTILE BISMUTH

Bismuth has a natural sensitivity to changes in temperature and magnetic field, but has been previously available only in non-ductile forms. Now pure bismuth in strip, grid and film form for Gauss and Hall measurements, and alloys in wire form for thermocouple legs, are available in a variety of standard sizes.—Fitzpatrick Electric Supply Co., 444 Irwin St., Muskegon, Mich.

For more information circle 548 on inquiry card.

MICRO-MIN CABLES AND CONNECTORS

Two new micro-miniature cables and connectors fill need for multiple carrier cables and connectors. The "Twinax" (160 ohm, low capacitance



and two conductors, shielded and jacketed) is slide-on type keyed for polarity. The "Triax" (50 ohm, double shielded coax insulated between shields and jacketed) is screw-type.—Microdot, Inc., 220 Pasadena Ave., S. Pasadena, Calif.

For more information circle 545 on inquiry card.

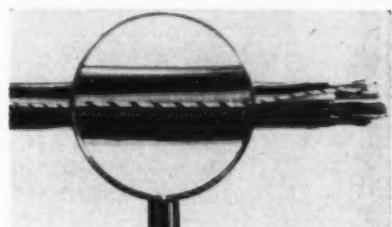
PRINTED CIRCUIT INK

New C-992 etching and plating resistant ink has unusual resistance to both ferric chloride, chromic acid, and cyanide solutions for etching and plating (or photo-resist) printed circuit processes. C-992 resists etching after air-drying with no further cure. For plating, baking at 200° to 250°F gives necessary resistance.—Union Ink Co., Inc., Ridgefield, N. J.

For more information circle 546 on inquiry card.

CLEAR VIEW VINYL TUBING

New No. 3022 clear vinyl fungus resistant, flame retardant, low temperature electrical tubing meets Mil-I-7444. For aircraft wiring conduits

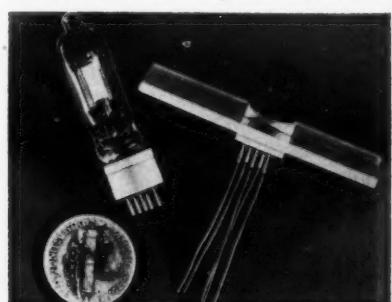


it is available in tubing size ranges I, II and III; has low ASTM brittle point of minus 100°F with max operating temperature of 185°F.—Irvington Div., Minnesota Mining & Mfg. Co., Irvington 11, N. J.

For more information circle 547 on inquiry card.

LOW-LOSS SOCKET

New Teflon-insulated compression-mounted transistor socket for missile



guidance and military electronics, is suitable for sub-miniature tubes with in-line leads and for printed circuits.—Fluorocarbon Products, Inc., Div. of U. S. Gasket Co., 600 N. 10 St., Camden, N. J.

For more information circle 549 on inquiry card.

MILITARY AUTOMATION

map and data cases, and other removable covers. Special stud heads may be provided to make covers tamper-proof. Servicing is simple because Quick-Lock opens or locks with a 90° turn. Inspection is easy because the stud is self-ejecting when it isn't locked. Quick-Lock compresses any under-lid gasket, sealing the enclosure. (From "Simmons Fasteners," 40-page catalog No. 1257. Simmons Fastener Corp., N. Broadway, Albany 1, N. Y.)

For more information circle 322 on inquiry card.

GEARHEADS

New planetary and spur gearheads are available for standard BuOrd servo-motors, sizes 11 and 15. Planetary have ratios 3500:1 with torque rating of 25 oz in and max backlash of 10 minutes. Overall length, 0.800".



Spur gearheads, low ratio to 37:1, overall 0.500" long for torque rating of 25 oz in and 0.609" long for torque rating of 50 oz in. Max backlash is 15 min. High ratio series, 37:1 to 20,000:1; have torque rating of 50 oz in and max backlash of 30 min. General specs for both include stainless steel shafts, anodized aluminum housing, gears to AGMA Precision 2, ball bearings to ABEC-5 with radial clearance to 0.0002" to 0.0004". Will operate in ambient range -55° to 260°F for guaranteed 2000 hrs. Meet MIL-G-3278 and MIL-E-5272A.—U.S. Gear Corp., 85 Bay State Rd., Wakefield, Mass.

For more information circle 550 on inquiry card.

READOUT INDICATOR

New Magneline electro-magnetic indicator displays numbers or symbols at rate of 2 per sec. Operates from

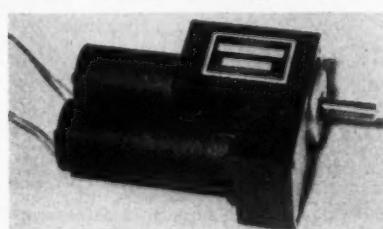


0.018 amp signal pulse and display holds position without power until next pulse. Digits or symbols can be read up to 25' free from parallax or glare. Interlocking construction permits easy stacking.—Patwin Div., Patent Button Co., Waterbury 20, Conn.

For more information circle 551 on inquiry card.

DIFFERENTIAL UNITS

New differentials produce algebraic sum or difference of two speeds in form of output shaft rpm for use in antenna drive, tracking device, or



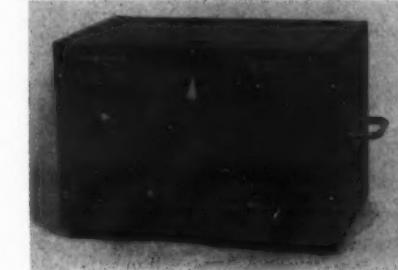
digital-to-analog applications. Each custom-built unit contains two ac or dc motors and a precision gearing unit. Typical performance is from 5 rpm clockwise, to 5 rpm counterclockwise with 300 oz-in torque. Speed

ranges 10 to 100 rpm in either direction, torques to 2500 oz-in are possible. Dimensions: 4 1/2" x 1 1/4" x 3" high; wt. 24 oz.—Globe Industries, Inc., 1784 Stanley Ave., Dayton 4, Ohio.

For more information circle 552 on inquiry card.

PHASE SHIFTER

New phase shifter consists of R-C shift network, phase inverter, and output cathode follower. Used with phase detector and signal generator,

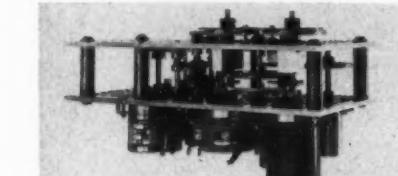


phase range is 0° to 360°, E_{out} lags E_{in} with max input signal of 25v rms. Phase lag is read directly from dial at 400 cps.—Advance Electronics Lab. Inc., 349-259 Terhune Ave., Passaic, N. J.

For more information circle 553 on inquiry card.

PROTOTYPE SERVO SYSTEMS

New instrument construction system drastically reduces assembly time of pilot-model servo computing unit, by-passing gear diagrams, layouts, assembly drawings and small quantity machine production. Composed of



small number of parts, all reusable for other programs, it permits quick and accurate predictions of size, cost and time of construction for panel mounting. Servo built in 30 man-hours is shown.—Gap Inst. Corp., 33 S. Grove St., Freeport, L. I., N. Y.

For more information circle 554 on inquiry card.

COMPUTING RESOLVERS

New Size 15 and 11 Precision Computing Resolvers with functional accuracies of 0.1% can be made with any required variations in shafts (in-



cl. Bu Ord shafts 0.187" dia) with threads and splines. Bu Ord Mk 4 Mod O brush block configurations are supplied on Size 15. Size 11 units with either terminals or leads have same accuracies as Size 15 units.—Clifton Precision Products Co., Inc., 9014 West Chester Pike, Upper Darby, Penna.

For more information circle 555 on inquiry card.

INDEXING CLUTCH

New Model S-100 clutch is designed for high-speed precision indexing in stepping devices for tape in electronic computers, for one revolution position-

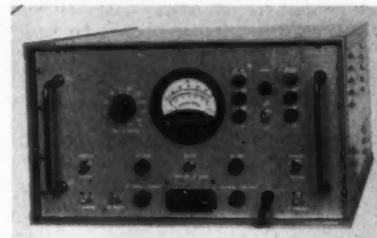


ing in instrument and automatic machinery, for photographic sequencing, etc. Triggering force of 0.5 in-lbs engages clutch in 1 ms, to transmit 10 in-lbs of torque. Clutch is 17/32" x 1.007" long.—Digitronics Corp., Albertson, L. I., N. Y.

For more information circle 556 on inquiry card.

PHASE ANGLE MONITOR

New Model 120 Phase Angle Meter and Monitor for testing and inspection of servo amplifiers, feedback



amplifiers, audio and power transformers, resolvers, goniometers, synchros, and polyphase systems, accepts sinusoidal or complex wave forms and provides output to chart recorder for phase-angle monitoring.—Control Electronics Co., Inc., Huntington Station, N. Y.

For more information circle 557 on inquiry card.

TOOLS and MATERIALS

EXPERIMENTAL ENCAPSULATION KIT

New experimental epoxy kit, containing materials and technical data

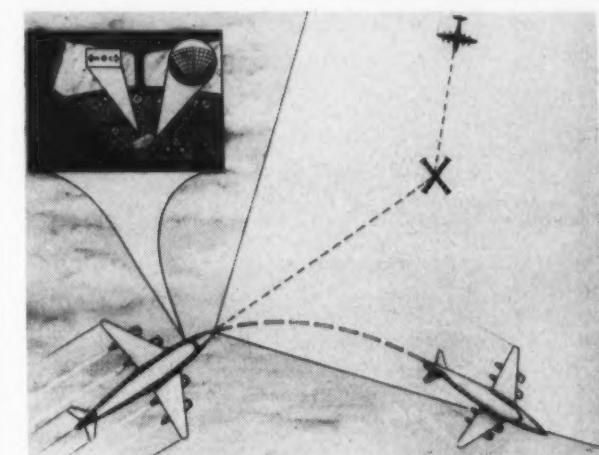


needed to encapsulate components now enables the engineer to test new procedures on his own components. Kit contains samples of "E-Case" shells, epoxy sheet for fabrication of special shapes, "E-Form" powder and pellets.—Epoxy Products, Inc., 137 Coit St., Irvington, N. J.

For more information circle 558 on inquiry card.

Air Collision Protection

Approaching at twice the speed of sound, jet aircraft will be protected from mid-air collisions by a new electronic collision avoidance system designed to elimi-



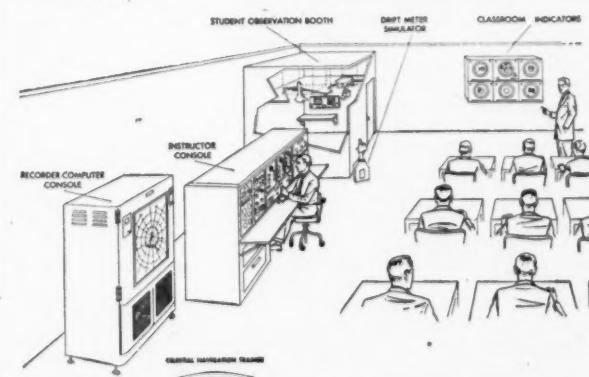
nate the four "near misses", that the Civil Aeronautics Board estimates occur daily on the airways.

The system is self contained and uses weather radar for its "eyes"; does not require associated ground nor other aircraft equipment. Four miniature antennas receive radar signals that search a 90° pie-shaped sector extending from the nose of the plane. The impulses feed an electronic brain with data necessary to compute the hazard and the possibility of collision, in two seconds. Operated with the minimum of operator training, the system has been designed by Federal Telecommunication Labs. Div. of International Telephone and Telegraph Corp., 500 Washington Ave., Nutley 10, N. J.

For more information circle 323 on inquiry card.

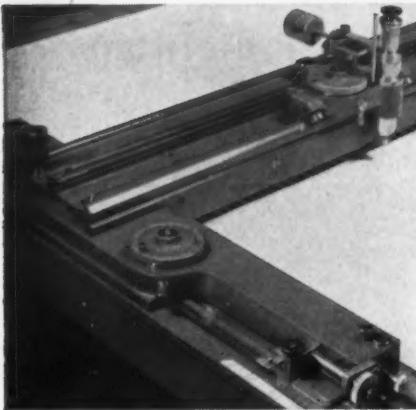
Simulator Trains Polar Navigators

The Reflectone Corporation, Stamford, Conn., working with the Navy Special Devices Center, Port Washington, N. Y., has designed and built a navi-



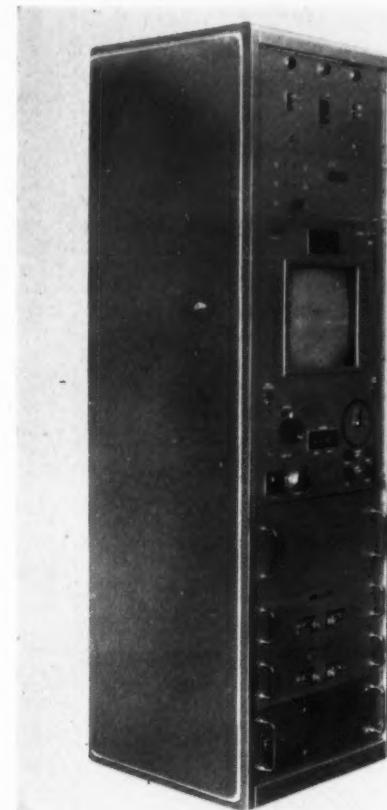
gational trainer to simulate day-and-night flight instrument and celestial conditions for flights at all latitudes, 100,000-ft altitude, 1500-kt air speed, 300-kt winds, and vertical speeds to 10,000 fpm.

For more information circle 324 on inquiry card.



4,000 Mile Radar Indicator

Displaying radar signals at ranges up to 4,000 miles, new Radar Display indicator (Fig. 1) provides conventional B-scope presentation on a 16" cathode-ray tube with P7 phosphor and is designed to operate with a radar system using pulse repetition frequencies be-



A BETTER PLOTTER

for Precision Layout of Grid Systems and Coordinate Positions

The Coordinatograph, a new, better plotting instrument, is now being used for all types of precision layouts. It plots within .001" over a 47½" x 47½" working table. Rack and pinion construction for counter dials assures accurate measurements. 7 diameter pricker microscope permits observation and plotting in one operation. Radii from 12" to 40" can be plotted with beam compass. Vertically laminated plywood table. Vibration-free tripod mount. Write now for free folder.

AERO SERVICE CORPORATION

210 E. Courtland St., Dept. 101, Philadelphia 20, Pa.

For more information circle 38 on inquiry card.

ARISTO

MIC-O-LITE

for

SHADOW FREE ILLUMINATION

The Mic-O-Lite is a small cold light source designed especially to produce shadow free illumination on small objects and specimens.

Housed in a doughnut type reflector which provides an aperture in its center, the Mic-O-Lite forms an ideal source for inspection, investigation, and research in the industrial and scientific fields. A variety of interchangeable lamps are available.

FOR EXPOSING PRINTED CIRCUITS, The ARISTO TRANS-LUMINATOR, equipped with Aristo U.V. 36 (3650A) grid lamps provides a COOL, EVEN, AND FAST light over its entire glass area.

Only 6 inches deep the unit is available in sizes from 12 x 12 inches square up to 32 x 36 inches. Easily installed in any printed circuit production setup, the Trans-Luminator, free of heat, glare, and dust, assures finer circuit reproductions faster and with greater working comfort.

Write for descriptive literature.

ARISTO GRID LAMP PRODUCTS INC.
65 Harbor Rd., Port Washington No., L. I., N. Y.

For more information circle 39 on inquiry card.

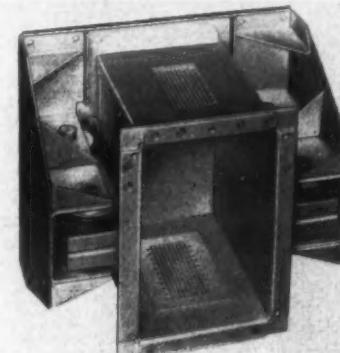
tween 18 and 45 cps. Inputs to the indicator are radar video, system trigger, and antenna positioning information transmitted by a 1- and 36-speed synchro system.

Range display is 0 to 4,000 nautical miles (maximum range capabilities are designed into the equipment at any PRF within this range), and azimuth display for a variable sector, 10° min and 350° max, with range and azimuth markers generated in the indicator. In the normal mode of operation the presentation shows the maximum range and the desired azimuth sector. An intensified horizontal band is presented variable from 50 to 500 nautical miles in width and positioned anywhere within the maximum range. This intensified area is expanded to full scale display in an alternate mode. The range and azimuth of a target at the intersection of the range and azimuth bugs may be read from calibrated dials on the front of the panel. The equipment containing the Radar Indicator and its associated circuitry and power supplies, was developed under subcontract with Lincoln Laboratories, M. I. T., by Allen B. Du Mont Laboratories Inc., 35 Market St., East Paterson, N. J.

For more information circle 325 on inquiry card.

MOUNTING SYSTEM

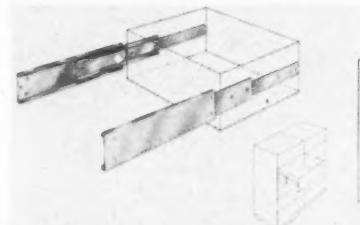
Model 1322 center-of-gravity all-metal mounting, designed for protection of fuel control equipment from destructive vibration and shock in high-temperature propulsion section



of IRBM missiles, features ventilation screens in top and bottom of enclosures to allow flow of cooling air. All-attitude multi-directional protection is assured. Natural frequency is 16 cps for an impressed excursion of 0.060" and equipment weight of 8 lbs.—Robinson-Aviation, Inc., Teterboro Air Terminal, Teterboro, N. J. For more information circle 559 on inquiry card.

RELAY RACK SLIDES

New Grant "Al-Thin" aluminum extruded slide with 100% stainless steel ball bearing action for standard relay rack mounting will support weight of 100 lbs per pair in the ex-



tended position. Tilting mechanism allows the chassis to tilt to a position of plus or minus 90°, eliminating need for rear access doors and rear aisles when installed in standard relay racks. Grant Pulley & Hardware Corp., High St., W. Nyack, N. Y.

For more information circle 560 on inquiry card.

CERAMIC COIL FORMS

New line of National ceramic coil forms includes 5 standard sizes; each with or without terminal collars; with up to four terminals per collar. All materials meet MIL-specs. Internal

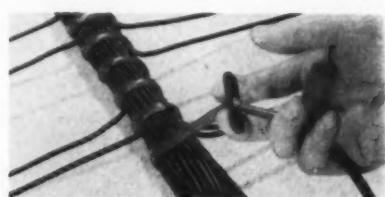


plastic kit container acts as etching tank. For development, application of resist in the form of ink, or in form of a special pressure sensitive, $\frac{1}{8}$ " wide tape, will permit frequent modifications to be made during prototype design. An assortment of sizes of XXXP copper-clad phenolic laminate is provided, also special printed circuit tube sockets.—Techniques, Inc., 52 Jackson Ave., Hackensack, N. J.

For more information circle 564 on inquiry card.

CABLE LACE

New cable-former tool is designed for rapid application of Wiring Tube, a spirally-cut, non-flammable poly-



ethylene cable lacing which will secure any number of wires in cables from $\frac{1}{4}$ " to 4" diameter, is useful in electronic equipment and control-panel installations, and for temporary circuits because it is easily removable for revisions and trouble shooting.—Panduit Co., Dept. MAS, 14461 S. Waverly Ave., Midlothian, Ill.

For more information circle 562 on inquiry card.

MICA INSULATION

New Capacitor Grade Isomica and Samica insulations, provide void-free mica insulation in unlimited size. Samica, a pure mica sheet made from refined foreign or domestic mica, is flexible, can be used in rolled capacitors instead of paper to withstand temperatures up to 1000°F. Isomica sheet has Samica base sheet impregnated with silicone resin for optimum dielectric characteristics at continuous operating temperatures to 550°F or intermittent operation to 750°F.—Mica Insulator Div., Minnesota Mining & Mfg. Co., Schenectady 1, N. Y.

For more information circle 563 on inquiry card.

PRINTED-CIRCUIT KITS

New kits contain high capacity liquid etchant, self-contained etching baths, pressure sensitive tape resist, and photographic resists. Pre-mixed liquid etchant avoids mixing, and



further development, application of resist in the form of ink, or in form of a special pressure sensitive, $\frac{1}{8}$ " wide tape, will permit frequent modifications to be made during prototype design. An assortment of sizes of XXXP copper-clad phenolic laminate is provided, also special printed circuit tube sockets.—Techniques, Inc., 52 Jackson Ave., Hackensack, N. J.

For more information circle 564 on inquiry card.

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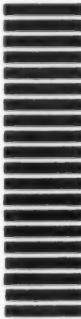
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3 23	103 123 143 163 183 203 223 243	303 323	403 423 443 463 483 503 523 543 563 583	603 623 643 663 683 703
4 24	104 124 144 164 184 204 224 244	304 324	404 424 444 464 484 504 524 544 564 584	604 624 644 664 684
5 25	105 125 145 165 185 205 225 245	305 325	405 425 445 465 485 505 525 545 565 585	605 625 645 665 685
6 26	106 126 146 166 186 206 226 246	306 326	406 426 446 466 486 506 526 546 566 586	606 626 646 666 686
7 27	107 127 147 167 187 207 227	307 327	407 427 447 467 487 507 527 547 567 587	607 627 647 667 687
8 28	108 128 148 168 188 208 228	308 328	408 428 448 468 488 508 528 548 568 588	608 628 648 668 688
9 29	109 129 149 169 189 209 229	309 329	409 429 449 469 489 509 529 549 569 589	609 629 649 669 689
10 30	110 130 150 170 190 210 230	310 330	410 430 450 470 490 510 530 550 570 590	610 630 650 670 690
11 31	111 131 151 171 191 211 231	311 331	411 431 451 471 491 511 531 551 571	611 631 651 671 691
12 32	112 132 152 172 192 212 232	312 332	412 432 452 472 492 512 532 552 572	612 632 652 672 692
13 33	113 133 153 173 193 213 233	313 333	413 433 453 473 493 513 533 553 573	613 633 653 673 693
14 34	114 134 154 174 194 214 234	314 334	414 434 454 474 494 514 534 554 574	614 634 654 674 694
15 35	115 135 155 175 195 215 235	315	415 435 455 475 495 515 535 555 575	615 635 655 675 695
16 36	116 136 156 176 196 216 236	316	416 436 456 476 496 516 536 556 576	616 636 656 676 696
17 37	117 137 157 177 197 217 237	317	417 437 457 477 497 517 537 557 577	617 637 657 677 697
18 38	118 138 158 178 198 218 238	318	418 438 458 478 498 518 538 558 578	618 638 658 678 698
19 39	119 139 159 179 199 219 239	319	419 439 459 479 499 519 539 559 579	619 639 659 679 699
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3 23	103 123 143 163 183 203 223 243	303 323	403 423 443 463 483 503 523 543 563 583	603 623 643 663 683 703
4 24	104 124 144 164 184 204 224 244	304 324	404 424 444 464 484 504 524 544 564 584	604 624 644 664 684
5 25	105 125 145 165 185 205 225 245	305 325	405 425 445 465 485 505 525 545 565 585	605 625 645 665 685
6 26	106 126 146 166 186 206 226 246	306 326	406 426 446 466 486 506 526 546 566 586	606 626 646 666 686
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10 30	110 130 150 170 190 210 230	310 330	410 430 450 470 490 510 530 550 570 590	610 630 650 670 690
11 31	111 131 151 171 191 211 231	311 331	411 431 451 471 491 511 531 551 571	611 631 651 671 691
12 32	112 132 152 172 192 212 232	312 332	412 432 452 472 492 512 532 552 572	612 632 652 672 692
13 33	113 133 153 173 193 213 233	313 333	413 433 453 473 493 513 533 553 573	613 633 653 673 693
14 34	114 134 154 174 194 214 234	314 334	414 434 454 474 494 514 534 554 574	614 634 654 674 694
15 35	115 135 155 175 195 215 235	315	415 435 455 475 495 515 535 555 575	615 635 655 675 695
16 36	116 136 156 176 196 216 236	316	416 436 456 476 496 516 536 556 576	616 636 656 676 696
17 37	117 137 157 177 197 217 237	317	417 437 457 477 497 517 537 557 577	617 637 657 677 697
18 38	118 138 158 178 198 218 238	318	418 438 458 478 498 518 538 558 578	618 638 658 678 698
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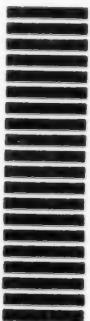
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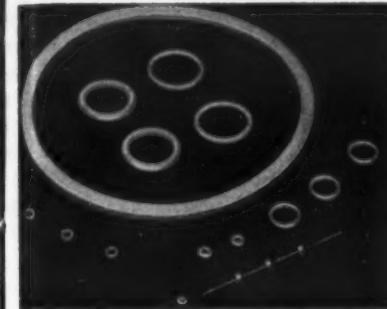
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Readers' Inquiry C

MACHINED RING SEALS

Chemical and mechanical seals of "Teflon" plastic with dimensional tolerances of 0.001" and less, are for extreme temperature, pressure and corrosive applications in chemical, aircraft, and electronic fields. Sizes are



presently limited to a maximum O.D. of $\frac{1}{8}$ ", $\frac{3}{4}$ " I.D. Machined from high-density, high-polymer "TSI" Teflon rod stock, some have been subjected to pressures of 30,000 psi, temperatures of from minus 200°F to plus 425°F and corrosives such as fuming nitric acid without failure.—Tri-Point Plastics, Inc., 175 I. U. Willets Rd., Albertson, L. I., N. Y.

For more information circle 568 on inquiry card.

HI-TEMP SEALS

New synthetic sapphire-to-metal window assemblies with windows to 3" dia and $\frac{1}{4}$ " thick can be



plied for radar, high-temperature, high-vacuum applications, and ultra-violet studies in the nuclear field. Assemblies can be installed by soldering, brazing or welding techniques.—Ceramaseal, Inc., Box 100, New Lebanon Center, N. Y.

For more information circle 568 on inquiry card.

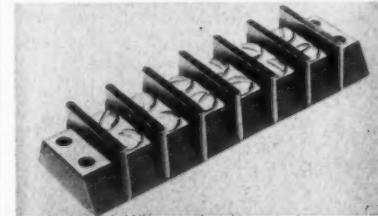
THINWALL INSULATED WI

New Mini-Thin Teflon-insulated wire for airborne electronic equipment permits up to 43% weight and 52% space reductions over Type Mil-W-16978B wire of same gauge. Has wall thicknesses from 4 to 10 mils, is rated for 300 v rms, — to 250°C range, and is available in sizes from 36 thru 22 AWG.—Tri-Point Plastics, Inc., 175 I. U. Willets Rd., Albertson, L. I., N. Y.

For more information circle 569 on inquiry card.

MOLDED TERMINAL BOARDS

New GEN-PRO terminal boards offer solid, insulated back, thicker, higher barrier design, and molded-in

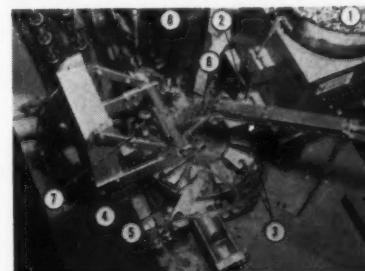


conductors for greater current-carrying capacity. Molded-in insert around mounting holes provides sectional strength, ease of handling and eliminates saddle plates. Greater amperage capacity enables design of more compact housings, boxes, chassis, etc.—GEN-PRO Sales Dept., 26 Rittenhouse Pl., Ardmore, Pa.

For more information circle 566 on inquiry card.

DIODE SEALER

Automatic diode sealer, developed by Raytheon, produces 1500 finished diodes per hour and is available for assembly of semi-conductors

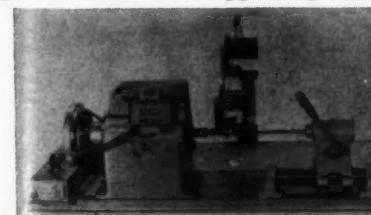


other small components. Diode feed from vibrating hopper through escapement (2), into lower electrodes (3) in dial (4), where they are filled with cone oil (5). Diode stems feed track (6) into fixture (7), which inserts them into cans nested in electrode. Assembly is then hermetically sealed by welding head (8).—Raytheon Mfg. Co., 103 River Waltham 54, Mass.

For more information circle 570 on inquiry card.

AUTOMATIC WIRE WINDER

New Model 800-AM universal automatic coil-winding machine with wire guides winds self-supporting lattice



wound universal coils and single or pi-wound R.F. chokes. Winding speed is up to 2000 rpm; max coil o.d. 3"; coil width $1\frac{1}{4}$ "; handles wire sizes 20 to 14.—Geo. Stevens Mfg. Co., Inc., Pucks Rd. at Peterson, Chicago, Ill.

For more information circle 567 on inquiry card.

SORTING MACHINE

New sorting machine can sort a variety of cylindrical, tubular, disc-shaped components, including resistors and capacitors into 2-classes. If required, one or more "no-go" tests can be incorporated. Speeds can be up to 5,000 unit

March-April, 1958

SEALS

sapphire-to-metal with windows up thick can be sup-



hour. Test pieces are carried to bins by mechanical transport, not free fall. Uses interchangeable, adjustable test heads so that a given piece of equipment can handle a wide variety of test pieces.—*Barnes Development Co., 213 W. Baltimore Ave., Lansdowne, Pa.*

For more information circle 571 on inquiry card.

MISCELLANEOUS

AXIAL BLOWER

New single phase axial blower operates on 27.5 v, 400 cycles; deliver 10 CFM at 0.11" static pressure with only 5w input; is 2" x 1 1/2" long. For

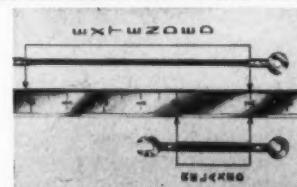


tube and other localized cooling, it meets MIL-E-5272A.—*Eastern Air Devices, Inc., 385 Central Ave., Dover, N. H.*

For more information circle 572 on inquiry card.

ELASTIC CONNECTORS

New Stretch cables, with 200% stretch factor, carry up to 2 amp. Single conductor shown has resistance

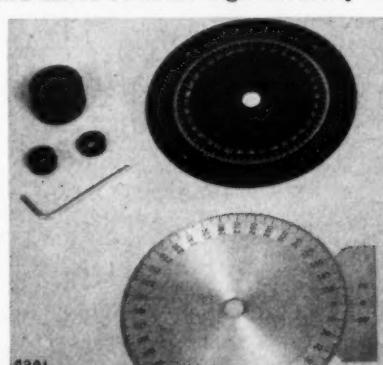


of 0.18 ohm. Stretch wire is suitable for communications equipment, microphones, etc.—*Stretch Wire Corp., P. O. Box 893, New Rochelle, N. Y.*

For more information circle 573 on inquiry card.

DIALS, VERNIERS, ETC.

New Standard Precision disk dials, ring dials, drum dials, verniers, hubs and knobs combine high accuracy and



low cost. Many sizes, styles of graduations, and finishes.—*Ackerman Engravers, 458 Broadway, New York 13, N. Y.*

For more information circle 574 on inquiry card.

LATED WIRE

Teflon-insulated electronic equipment 43% weight and less over Type E wires of same gauge. Sizes from 4 to 7 00 v rms, -90° C. is available in 22 AWG.—*Thermal Products, Inc., 4 East 45th St.,*

569 on inquiry card.

EALER

sealer, developed for 1500 finished parts. It is available for conductors and



ents. Diode cans in hopper (1), (2), into hollow tube (3) in dial feed tube filled with silicon stems feed from here (7), which is nested in lower tube and then hermetically sealed head (8).—*103 River St.,*

570 on inquiry card.

MACHINE

chine can sort wide range of parts, including rings, into 2-to-20 one or more "go/no-go" incorporated. 5,000 units per

Gain Variations In An Output-Rate-Stabilized Servomechanism

The purpose of this paper is to provide a graphical representation of the effects of gain changes at various points in an output rate stabilized servomechanism. Figures 2, 3, and 4 summarize the results in the form of open loop vs. frequency asymptotes plotted on log-log coordinates. In the absence of a need for more elaborate stabilizing techniques, these servos employ output rate damping in the following forms: (1) Viscous friction applied to the output member, (2) a controller characteristic which causes the torque to decrease linearly with increasing speed, giving the same effect as viscous friction, (3) output rate (tachometer) feedback, and (4) any combination of 1, 2, and 3.

The two-loop system which is analyzed is shown in block diagram form in Fig. 1. It is considered to be somewhat general because: (a) by setting K_4 equal to zero, it represents a single loop system with viscous friction and/or motor speed-torque droop damping; by f equal to zero it represents a system with output rate feedback damping only; by setting K_1 equal to unity it represents the common type of system in which the output rate signal is summed at the same point at which the input and output signals are summed.

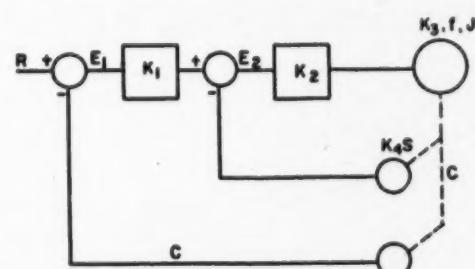


FIG. 1. BLOCK DIAGRAM—Positioning Servomechanism with Output Rate Damping.

LIST OF SYMBOLS

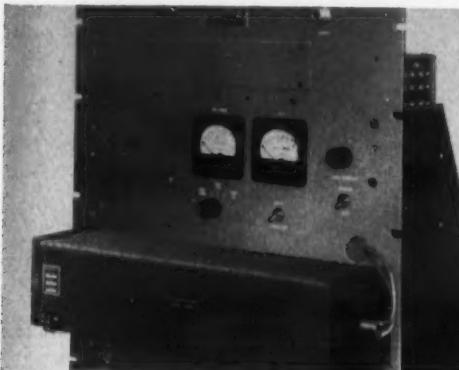
C	= Position output (controlled variable)
E_1	= Main actuating signal, or error
E_2	= Minor loop error
f	= Damping coefficient
J	= Inertia of output system
K_1	= Forward gain, exclusive of minor loop
K_2	= Forward gain of minor loop
K_3	= Constant relating torque (or force) of controller to its input signal
K_4	= Constant relating the signal from rate measuring device to the output rate
S	= LaPlace operator

(From 6-page paper by Mr. E. E. Trunk of the Servo Corporation of America, 2020 Jericho Turnpike, New Hyde Park, N. Y.)

For this literature circle 326 on inquiry card.

UHF Marker Generator

A new frequency marker generator for scientific measurements, communications systems, and telemetry (where more precise frequency determination is required than is possible with a frequency meter)

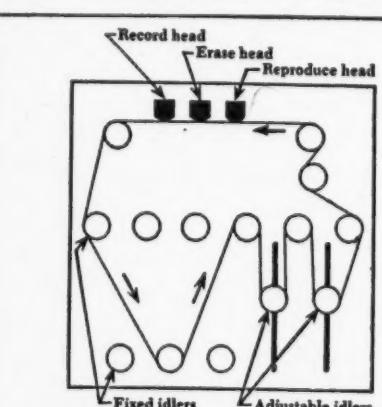


2,000 to 4,000 mc. The principles utilized make similar equipment possible for determination of frequencies and for frequencies as high as 10,000 mc. In operation, eleven simultaneous marker frequency signals are furnished, uniformly distributed throughout the range 2,000 to 4,000 mc, at increments of 100 mc. Any one or combination of marker frequencies can be selected at will; the others can be suppressed. This instrument was developed for General Electric of Syracuse under ARDC contract by Allen-Bradley, Inc., 35 Market St., East Paterson, N. J.

For more information circle 327 on inquiry card.

Recorder Chases Its Tail

At first glance the tape-loop recorder is rather like a puppydog chasing its tail, but electronically, it is interesting as a reinvention of the wheel.



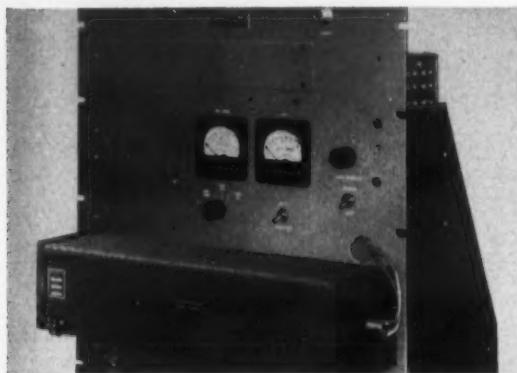
The tape loop cycles in a period equal to loop length divided by tape speed. Movable idlers plus use of varying numbers of fixed idlers accommodate any loop length from minimum to maximum. Data can be repeated indefinitely or can be continuously erased.

The tape loop also is useful in time-delay, program control and wave analysis applications, to name a few. (From 16-page brochure "How to do it with Magnetic Tape", Ampex Corporation, 934 Charter St., Redwood City, Calif.)

For this literature circle 328 on inquiry card.

UHF Marker Generator

A new frequency marker generator for countermeasures, communications systems, and telemetering (where more precise frequency determination is required than is possible with a frequency meter) covers

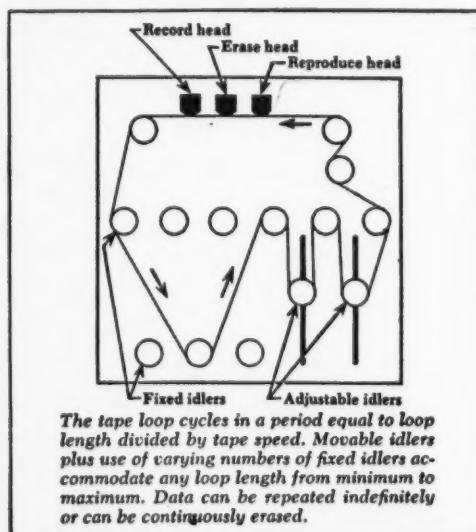


2,000 to 4,000 mc. The principles utilized make similar equipment possible for determination of lower frequencies and for frequencies as high as 10,000 mc. In operation, eleven simultaneous marker frequency signals are furnished, uniformly distributed throughout the range 2,000 to 4,000 mc, at increments of 200 mc. Any one or combination of marker frequencies can be selected at will; the others can be shut off. This instrument was developed for General Electric of Syracuse under ARDC contract by Allen B. Du Mont Labs. Inc., 35 Market St., East Paterson, N. J.

For more information circle 327 on inquiry card.

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At first glance the tape-loop recorder is rather like a puppydog chasing its tail, but electronically, it is as interesting as a reinvention of the wheel.



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For this literature circle 328 on inquiry card.

New Products—Cont.

TORSION RIDE FOR GYROS

New Federal torsion bar vibration and shock mounting systems for airborne gyroscopic instruments are said to prevent all relative rotations between instrument and airframe which would cause gyro to sense an erroneous



rotation. Concept, developed jointly by Federal Shock Mount Corp., and Lear, Inc., is said to be successful in restricting roll, pitch, or yaw of upper mounting tray with respect to lower tray, while effectively isolating shock and vibration.—Federal Shock Mount Corp., 1060 Washington Ave., New York 56, N. Y.

For more information circle 575 on inquiry card.

NYLON CABLE CLAMPS

New Dupont "Zytel 101" nylon resin in cable clamps designed for strength,



durability and chemical resistance, in temperatures from -60° to +300°F. Meet Military specs P20693, they are available in thirteen sizes from $\frac{1}{8}$ " to 1" I.D.—Richco Plastic Co., 4445 Fullerton Ave., Chicago 39, Ill.

For more information circle 576 on inquiry card.

LINEAR MOTION BEARING

New type Inst-4812 BALL BUSHING is designed for extremely low-friction linear motion applications in inertial guidance systems of missiles and aircraft. Re-circulating ball principle provides unlimited travel which enables accelerometers and other instruments to have a wide range. Restricted new method of attaining ex-



tremely low threshold sensitivity will be made available to authorized people. The new ball bushing is interchangeable with standard BALL BUSHING XA4812, with a bore I.D. of 0.2500", nominal O.D. of 0.5000" and length of 0.750". Weight is 0.02 lbs; it has rolling load rating of 13 lbs and static load of 22 lbs.—Thomson Industries, Inc., Manhasset, N. Y.

For more information circle 577 on inquiry card.

MISSILE COOLING FAN

New Aximax-3 axial fan for cooling electronic gear in missiles and aircraft turns up 20,000 rpm to deliver 165 cfm although less than 3" in diameter and weighing only 14 oz. Either constant or variable speed



motors are available from 155 v single-phase, or 220 v 3-phase, 400 cps power. "Altivar" models maintain constant cooling efficiency at changing altitudes while running at low speeds and with low noise at ground levels.—Rotron Mfg. Co., Inc., Schoonmaker Lane, Woodstock, N. Y.

For more information circle 578 on inquiry card.

CRT GUN SHIELD

New Netic Co-Netic magnetic shield which fits over the gun portion of cathode ray tubes provides moderate shielding of fields. Designed to eliminate most indications caused by long fields entering at face of tube, it is

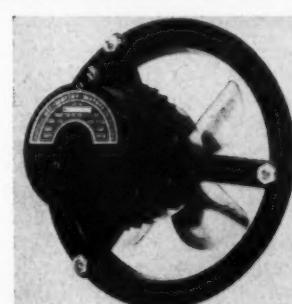


shock insensitive, non-retentive and does not require periodic annealing.—Magnetic Shield Div., Perfection Mica Co., 1322 Elston Ave., Chicago 22, Ill.

For more information circle 579 on inquiry card.

COOLING FAN MOTORS

New E2123-200 high-speed, high-slip, 3-phase 400-cycle motor automatically changes speed with varying

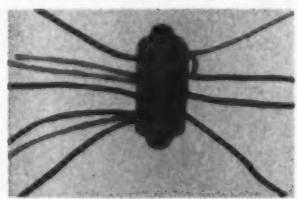


altitudes and densities to provide constant cooling efficiency from sea level to 70,000' altitude. Delivers 145 CFM at 0" S.P. at sea level and changes speed to deliver 440 CFM at 0" S.P. at 70,000'; meets MIL-M-7969A, MIL-E-5272A and MIL-P-7212B, Air Force spec. #32590.—Air Marine Motors Inc., 369 Bayview Ave., Amityville, L. I., N. Y.

For more information circle 580 on inquiry card.

TERMINAL BLOCK

New terminal block eliminates lugs, soldering and screws and each station holds from one 0.010" to three #14



wires. Employs V-cam action—quarter turn opens for insertion of wire, reverse turn locks in place.—Willow Mfg. Corp., Dept. A, 825 Bronx River Ave., New York 72, N. Y.

For more information circle 581 on inquiry card.

3-WIRE CORDSETS

New grounded-conductor cordsets and cord accessories for shipboard and other appliances, grounded under



BuShips and Underwriter Labs rules are now available to manufacturer's requirements.—Miller Electric Co., 120 Main St., Pawtucket, R. I.

For more information circle 582 on inquiry card.

MAGNETIC VISUAL AID

Visual, flexible control of business or military project operations is provided by new Magnetic Control board



which holds visual elements firmly on its surface. Many types of visual elements available to fit user's needs.—Methods Research Corp., 430 Mosel Ave., Staten Island 4, N. Y.

For more information circle 583 on inquiry card.

BOILER TUBE LEAK TESTER

New Solu-Bridge (RD-255) for detection and measurement of condenser tube leakage, particularly in marine service, is calibrated 0.2 - 1.5 equivalent ppm chlorides. Is available as a measuring or signalling device with manual or automatic temperature compensation.—Industrial Instruments, Inc., 89 Commerce Rd., Cedar Grove, N. J.

For more information circle 584 on inquiry card.

MILITARY AUTOMATION

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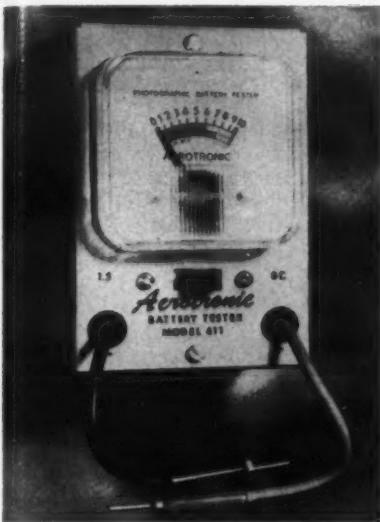
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BATTERY TESTER

New model 411 Battery Tester tests both 1½ v and 22½-30 v BC batteries, and indicates battery's ability to properly ignite a flash bulb or charge



a condenser in a BC system for reliable synchronization. Shows condition of battery as "good" or "replace."—*Aerotronic Assoc., P.O. Box 419, Concord, N. H.*

For more information circle 585 on inquiry card.

TRANSISTORIZED MEGAPHONE

New "Power-Voice" with 15-watt voice weighs less than 8 lbs, is power-



ed from six flashlight cells, and is ruggedly weather resistant.—*Motorola, Inc., 4545 W. Augusta Blvd., Chicago 51, Ill.*

For more information circle 586 on inquiry card.

ALUMINUM RING FANS

New Models 1N65 and 1N80 one piece cast aluminum ring fans feature four point motor suspension,



with sleeve or permanently sealed ball bearings. A six wing propeller develops higher pressure performance. Standard mounting dimensions permit easy installation inside or outside electronic cabinets.—*McLean Engineering Labs., P.O. Box 228, Princeton, N. J.*

For more information circle 587 on inquiry card.

NYLON-ENCLOSED MERCURY SWITCH

New MPI-2 nylon-enclosed mercury switch for photographic and testing applications where chemical splash is a factor, consists of a glass-tube mercury switch embedded in a syn-

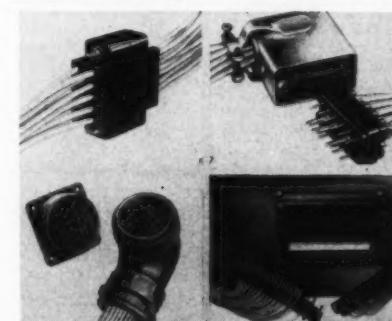


thetic rubber compound and enclosed inside a nylon can. Small operating force and the ability to repeat operation at the same angle of tilt assure precision performance. Temperature range from -35° to 200°F. Contact arrangement is SPST. Switch position, as mounted, determines whether circuit is normally-open or normally-closed. Rated at 3 amp, 115 vdc, resistive load.—*Micro Switch, Freeport, Ill.*

For more information circle 588 on inquiry card.

SOLDERLESS CONNECTORS

New solderless HYFEN connectors speed wiring of electronic and missile harnesses and add dependability by using crimped pins and sockets that

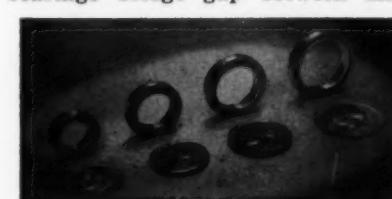


snaplock into plug or receptacle. Types include 15-contact, multi-purpose plug and receptacle connector; feed-thru, modular design, multiple insert connector with inserts removable from frame for easy contact insertion or removing; an AN-type; and an MS miniature type.—*Burndy Corp., Norwalk, Conn.*

For more information circle 589 on inquiry card.

SPACE-SAVING BEARINGS

New Midget T Series precision ball bearings bridge gap between mini-

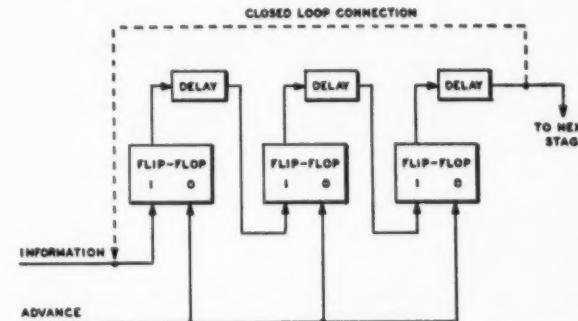


ature bearings and conventional inch series, for instruments, missiles, etc., where space-saving is more important than load capacity.—*Split Ballbearing Div. of MPB, Inc., Lebanon, N. H.*

For more information circle 590 on inquiry card.

Shift Register

The shift register is one of the simplest and most frequently used digital devices. Its applications include temporary storage of digital data, conversion of data from serial to parallel, or from parallel to serial and generation of pulse patterns.

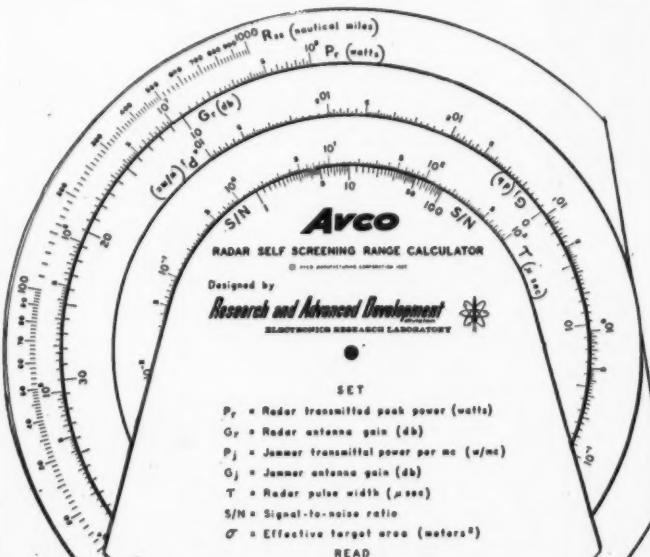


(Several techniques for generating pulse patterns using transistorized digital circuits are also presented in 2-page Newsletter #1, from *Navigation Computer Corp., 1621 Snyder Ave., Philadelphia 45, Pa.*)

For more information circle 329 on inquiry card.

Countermeasures Calculator Beats Slide Rule

A radar self-screening range calculator eliminates slide-rule calculations formerly required to determine distance at which signal energy received at the radar is large enough to show through the jamming noise.



Also, the radar designer, having determined a figure of merit, can use the device to alter design parameters without recomputing his entire problem. (Radar engineers may obtain copies of calculator by request on company letterhead to James McHugh, Director of Publications, Electronic Research Lab., Avco Research and Advanced Development Div., 750 Commonwealth Ave., Boston, Mass.)

FREED

MIL-T-27A POWER,
FILAMENT, PULSE
& AUDIO TRANSFORMERS

FOR IMMEDIATE
DELIVERY FROM STOCK

POWER TRANSFORMERS-STANDARD

All primaries 105/115/125 v., 60 c.p.s.

Cat. No.	Hi Volt Sec. ct	DC Volts	DC Amps	Filament		MIL Case Size
				#1	#2	
MGP1	400/200	✓ 185	.070	6.3/5	2 6.3	3 HA
MGP2	650	✓ 260	.070	6.3/5	2 6.3	4 JB
MGP3	650	✓ 245	.150	6.3	5 5.0	3 KB
MGP4	800	✓ 318	.175	5.0	3 6.3	8 LB
MGP5	900	✓ 345	.250	5.0	3 6.3	8 MB
MGP6	700	✓ 255	.250			KB
MGP7	1100	✓ 419	.250			LB
MGP8	1600	✓ 640	.250			NB

FILAMENT TRANSFORMERS-STANDARD

All primaries 105/115/125 v., 60 c.p.s.

Cat. No.	Secondary		Test VRMS	MIL Case
	Volts	Amps		
MGF1	2.5	3.0	2,500	EB
MGF2	2.5	10.0	2,500	GB
MGF3	5.0	3.0	2,500	FB
MGF4	5.0	10.0	2,500	HB
MGF5	6.3	2.0	2,500	FB
MGF6	6.3	5.0	2,500	GB
MGF7	6.3	10.0	2,500	JB
MGF8	6.3	20.0	2,500	KB
MGF9	2.5	10.0	10,000	JB
MGF10	5.0	10.0	10,000	KB

PULSE TRANSFORMERS

Cat. No.	Block 2 Obs.	Int. Coup's	Lav. Pow. Out.	Pulse Voltage Microvolts		Pulse Duration Microseconds	Duty Rate	No. of Waves	Test Volt. KV/m	Char. Imp. Ohms
				0.25/0.25/0.25	0.25/0.25/0.25					
MPT1	✓	✓	✓	0.25/0.25/0.25	0.25/0.25/0.25	0.2-1.0	.004	3	0.7	250
MPT2	✓	✓	✓	0.25/0.25	0.25/0.25	0.2-1.0	.004	2	0.7	250
MPT3	✓	✓	✓	0.5/0.5/0.5	0.2-1.5	.002	3	1.0	250	
MPT4	✓	✓	✓	0.5/0.5	0.2-1.5	.002	2	1.0	250	
MPT5	✓	✓	✓	0.5/0.5/0.5	0.5-2.0	.002	3	1.0	500	
MPT6	✓	✓	✓	0.5/0.5	0.5-2.0	.002	2	1.0	500	
MPT7	✓	✓	✓	0.1/0.1/0.1	0.5-1.5	.002	3	1.5	200	
MPT8	✓	✓	✓	0.7/0.7	0.5-1.5	.002	2	1.5	200	
MPT9	✓	✓	✓	1.0/1.0/1.0	0.7-3.5	.002	3	2.0	200	
MPT10	✓	✓	✓	1.0/1.0	0.7-3.5	.002	2	2.0	200	
MPT11	✓	✓	✓	1.0/1.0/1.0	1.0-5.0	.002	3	2.0	500	
MPT12	✓	✓	✓	0.15/0.15/0.15	0.2-1.0	.004	4	0.7	700	

AUDIO TRANSFORMERS

Freq. resp. 300 to 10000 cps ± 2 dB. All Case Sizes All

Cat. No.	Application	Impedance			DC Current
		Prim. Ohms	Cs	Cs	
MGA1	Single or P.P. Plates — to Single or P.P. Grids	10K	✓ 90K Split	✓ 10 10	+15
MGA2	Line to Voice Cell	600	4, 8, 16	0 0	+33
MGA3	Line to Single or P.P. Grids	600	135K	✓ 0 0	+15
MGA4	Line to Line	7.4K	600	0 0	+15
MGA5	Single Plate to Line	7.0K	4.8T	40 40	+33
MGA6	Single Plate to Voice Cell	7.0K	4.8T	40 40	+33
MGA7	Single or P.P. Plates to Line	15K	✓ 600 Split	10 10	+33
MGA8	P.P. Plates to Line	24K	✓ 600 Split	10 1	+30
MGA9	P.P. Plates to Line	60K	✓ 600 Split	10 1	+27

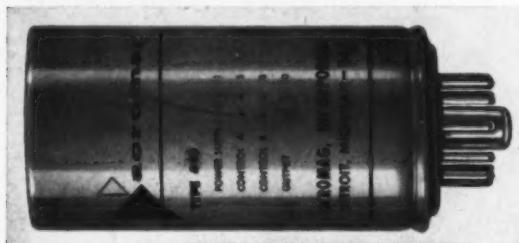
Write for further information on these units, or special designs. Send for NEW 48 page catalog. Also ask for complete Laboratory Test Instrument Catalog.

FREED
TRANSFORMER CO., INC.
1793 Wairfield Street
Brooklyn (Ridgewood) 27, New York

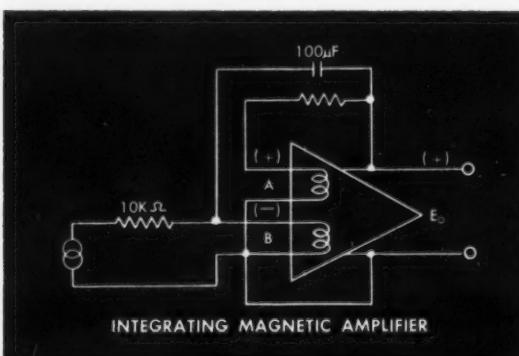
For more information circle 40 on inquiry card.

Magnetic Amplifier Integrates Control Signals

The Acromag model 430 integrating magnetic amplifier, when used in a radar or radio beam-tracking missile automatic pilot, tends to ignore usual perturbances of radio beams, resulting in a smoother, more



accurate ride. In this application, the missiles present position is compared to the desired radar beam position. The resulting error signal is fed into the Model 430 amplifier and the output signal used as a part of the steering signal. If the missile remains "off course," the percentage of steering signal from the integrating magnetic amplifier keeps increasing with time, forcing the missile back to a more accurate track.



When applied to speed control (velocity servos), the 430 amplifier compares the commanded speed with the tachometer feedback signal and integrates any difference between the signals. Using good components, a velocity servo accuracy better than 0.1% can be achieved.

Besides its use as an integrating amplifier, it is used with feedback circuits to produce inputs as great as 1 megohm and linearities to 1%. Can replace chopper-stabilized amplifiers where extreme bandwidth is not required.

Produced by Acromag, Inc., 22519 Telegraph Rd., Detroit 41, Mich., the Model 430 amplifier requires less than 3 watts power from a standard 115 v, 400 cycle supply. Control winding A has a nominal gain of 1 vdc for 100 μamp dc input. Winding B has gain of 10 vdc for the same input. Signal frequency response is from dc to 25 cps.

For more information circle 330 on inquiry card.

M New Literature

INFRARED & OPTICS

INFRARED applications in military weapons and industrial control systems are detailed in 16-page report, "Around the Servo Circuit" (Vol. III No. 1).—Servo Corporation of America, 20-20 Jericho Tpk., New Hyde Park, L. I., N. Y.

Circle 601 on inquiry card.

CINE THEODOLITE Model Kth 57 for ballistic and missile photography is described in new 8-page brochure.—Perkin-Elmer Corp., Norwalk, Conn.

Circle 602 on inquiry card.

EKTRON DETECTORS for infrared detection and measurement are described with characteristics and applications in new 24-page pamphlet, U-2.—Eastman Kodak Co., Special Products Sales Div., Rochester 4, N. Y.

Circle 603 on inquiry card.

METALLIZED COMPONENTS and anti-reflection coating for optics meeting JAN-F-675 are subject of new 4-page bulletin.—Metavac Inc., 45-68 162 St., Flushing 58, N. Y.

Circle 604 on inquiry card.

ELECTRONIC COMPONENTS

ULTRA-MIN CERAMIC DISC CAPACITORS (nickel-size has 2.2 μfd) are described in new 2-page engineering preview EP-87.—Centralab, Div. of Globe-Union Inc., 900 E. Keefe Ave., Milwaukee 1, Wisc.

Circle 605 on inquiry card.

TANTALUM CAPACITORS meeting MIL-C-3965 are described in new 2-page bulletin TQ-10.—Minitronics Corp., 328 Grand St., New York 2, N. Y.

Circle 606 on inquiry card.

MOLDED THERMOPLASTIC CAPACITORS are described in new 2-page bulletin 131 B 2.1.—Aerovox Corp., New Bedford, Mass.

Circle 607 on inquiry card.

SUBMIN MYLAR CAPACITORS, TYPES 616G and 617G, and 12 other types are described in new 4-page data sheet.—Good-All Electric Mfg. Co., Ogallala, Neb.

Circle 608 on inquiry card.

TANTALUM CAPACITORS, HP type for temperatures to 125°C are described in new 4-page bulletin 6.111-1.—Fansteel Metallurgical Corp., Rectifier-Capacitor Div., 2200 Sheridan Rd., North Chicago, Ill.

Circle 609 on inquiry card.

DC OUTPUT TRANSDUCER for missile telemetering and servo use, having high sensitivity to rotation with low acceleration and vibrational sensitivity is described in 2-page technical sheet.—Servomechanisms, Inc., 12500 Aviation Blvd., Hawthorne, Calif.

Circle 610 on inquiry card.

PRECISION POTs, $\frac{1}{2}$ " dia., 125°C operation, are described in new 2-page tech data sheet No. 103.—Carter Mfg. Corp., 23 Washington St., Hudson, Mass.

Circle 611 on inquiry card.

WIRE-WOUND precision resistors, series CB, from $\frac{1}{4}$ to $1\frac{1}{2}$ w, -55° to 85°C temp range, are specified in 2-page bulletin CB-3.—Kelvin Electric Co., 5907 Noble Ave., Van Nuys, Calif.

Circle 612 on inquiry card.

PRECISION WIREWOUND RESISTORS are described in new 12-page catalog.—R.C.L. Manufacturing Co., New Jersey Ave., Riverside, N. J.

Circle 613 on inquiry card.

MINI TRIMMER POTs are described in new 2-page tech data sheet #104.—Carter Mfg. Corp., 23 Washington St., Hudson, Mass.

Circle 614 on inquiry card.

TIME DELAY GENERATORS and pulse generators are described in new 4-page catalog.—Rutherford Electronics Co., 8944 Lindblade St., Culver City, Calif.

Circle 615 on inquiry card.

PULSE TRANSFORMERS, filters, and pulse-forming networks are described in new 13-page catalog-folder.—ESC Corp., 534 Bergen Blvd., Palisades Park, N. J.

Circle 616 on inquiry card.

CUSTOM TRANSFORMERS for computers and test equipment, custom amplifiers and saturable reactors for control are described in new 8-page catalog.—Light Electric Corp., 214 Lackawanna Ave., Newark 3, N. J.

Circle 617 on inquiry card.

MAGNETIC AMPLIFIERS and saturable transformers are described in new 46-page catalog #581.—Freed Transformer Co. Inc., 1718 Weirfield St., Brooklyn 27, N. Y.

Circle 618 on inquiry card.

SUBMIN PULSE TRANSFORMER is described in new bulletin.—Pulse Engng. Inc., 2657 Spring St., Redwood City, Calif.

Circle 619 on inquiry card.

HI-POWER RF CHOKE No. 160-6 (5000 v dc at 2.5 amps) is described in new 1-page pamphlet.—P & H Electronics, Inc., 424 Columbia St., Lafayette, Ind.

Circle 620 on inquiry card.

WAVEGUIDE PRESSURE WINDOWS are described in new 4-page tech data sheet #CP11-1.—Microwave Associates Inc., Burlington, Mass.

Circle 621 on inquiry card.

RADIO INTERFERENCE filter design is subject of 8-page Sperry Gyroscope Co. paper reprinted by All-Tronics Inc.—All-Tronics Inc., 45 Bond St., Westbury, N. Y.

Circle 622 on inquiry card.

COAXIAL LINE terminations with type BNC or TNC connectors are described in technical sheet.—Stoddart Aircraft Radio Co., Inc., 6644 Santa Monica Blvd., Hollywood 38, Calif.

Circle 623 on inquiry card.

CIRCUIT BREAKING Series "C" Connectors meeting Mil-Specs are described in 62-page bulletin.—Pyle-National Co., 1334 N. Kostner Ave., Chicago 51, Ill.

Circle 624 on inquiry card.

CRYSTAL FILTER characteristics for steady-state and pulse responses are given in 6-page engineering memorandum on Type 22 HF Crystal Filters.—Hycon Eastern, Inc., 75 Cambridge Pkwy., Cambridge 42, Mass.

Circle 625 on inquiry card.

TRIAX CONNECTORS and p-c connectors are described in new 4-page bulletin.—H. H. Buggie Inc., Box 817, Toledo 1, Ohio.

Circle 626 on inquiry card.

SERVOS, MOTORS

MINIATURIZED SERVO systems and components are discussed in new file folder and spec sheets.—Waldorf Inst. Co., Huntington Station, L. I., N. Y.

Circle 627 on inquiry card.

GENEMOTORS, in new 1½" and 2" sizes are described in new 28-page dynamotor catalog #158.—Carter Motor Co., 2707 A W. George St., Chicago 18, Ill.

Circle 628 on inquiry card.

SPECIAL DC motors and generators for military applications available on custom basis are described in 8-page bulletin GED-3343.—General Electric Co., Schenectady 5, N. Y.

Circle 629 on inquiry card.

SERVOMOTOR, Model 18SM490, designed for continuous hot duty at 200°C is described with drawings in new 4-page data sheet #1286.—Beckman/Helipot Corp., Newport Beach, Calif.

Circle 630 on inquiry card.

SYNCHROS, servomotors, etc., are described in new 6-page data sheet, issue A.—Muirhead Insts. Inc., 677 Fifth Ave. New York 22, N. Y.

Circle 631 on inquiry card.

PLUG-IN balancing potentiometers for interchangeability, is subject of 2-page data sheet, Series P.—Scientific Atlanta Inc., 2162 Piedmont Rd., N. E., Atlanta 9, Ga.

Circle 632 on inquiry card.

MINIATURE HI-TORQUE dc motor for missile applications and other missile control components are described in Feb. 1958 issue of "Component News".—Barber-Colman Co., Rockford, Ill.

Circle 633 on inquiry card.

MINI DC MOTORS, Series "A" with Alnico VI fields, have specs for precision uses listed in new 2-page catalog sheet No. 2857.—Servo-Tek Products Co., 1086 Goffle Rd., Hawthorne, N. J.

Circle 634 on inquiry card.

SERVO SHEETS for duplex test re-

LABEL for

DIGITAL or test

ANALOG de-

TRUE A is de-

G-15 C Units

SCIENT ap-

CUSTO magnet

AIRBO tape re-

MONIT display

MONIT are de-

MONIT --Appl

MONIT P. O. I.

MONIT

DATA HANDLING

SERVO SYSTEM ANALYZER WORK-SHEETS. Four transparent masters for duplication by photographic processes serve for permanent record on test results.—Servo Corporation of America, 20-20 Jericho Turnpike, New Hyde Park, N. Y.
Circle 635 on inquiry card.

LAIL (Light Aircraft Binary Information Link) technical information is provided in 12-page bulletin.—Stromberg-Carlson, Electronics Div., 1400 N. Goodman St., Rochester 9, N. Y.
Circle 636 on inquiry card.

DIGITAL LOGGING of analog process or test data is explained in new 6-page technical bulletin No. 180a.—The Kybernetes Corp., 75 Varick St., New York 5, N. Y.
Circle 637 on inquiry card.

ANALOG COMPUTER model 3100, is described in new 8-page data file #310.—Donner Scientific Co., Concord, Calif.
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CUSTOM MADE DISC recording and magnetic tape heads are described in new 4-page bulletin.—Edwin A. Lipp, 1511 Colorado Blvd., Santa Monica, Calif.
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AIRBORNE AND MOBILE magnetic tape recorders to withstand environmental variations are described with specs in new 16-page brochure, Ampex 800.—Ampex Corp., 934 Charter St., Redwood City, Calif.
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ACCELEROMETER FLAT FREQUENCY response is discussed in 4-page Instrument Notes #32.—Statham Instruments Inc., 12401 West Olympic Blvd., Los Angeles 64, Calif.
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TOTAL TEMPERATURE PROBE, Model 103, for missile, aircraft and jet engine research is described in 4-page bulletin 15811.—Rosemount Engineering Co., 9424 Lyndale Ave. So., Minneapolis 20, Minn.
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MEASUREMENT of radioactivity, 7 main systems are compared in new data sheet PC-58.—Nuclear Measurements Corp., 2460 N. Arlington Ave., Indianapolis 18, Ind.
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GERMANIUM ALLOY transistors, types 2N43 and 2N44, are described in 4-page technical specs bulletin ECG-292.—General Electric Co., Semiconductor Products Dept., Syracuse, N. Y.
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SILICON DIODE protection of sensitive current devices is explained in 4-page Vol. 1 No. 1, Semiconductor Application Notes.—Hoffman Electronics Corp., 930 Pitner Ave., Evanston, Ill.
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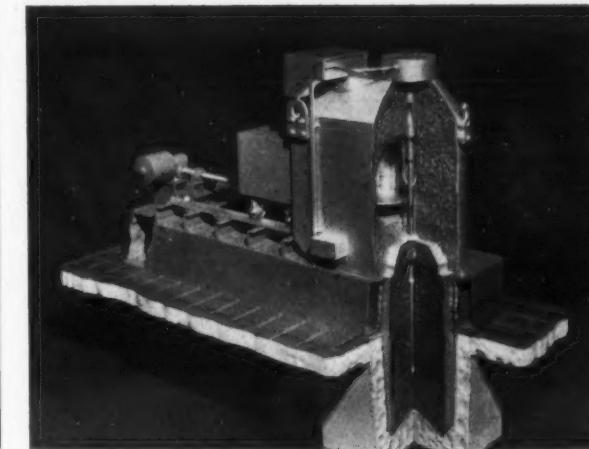
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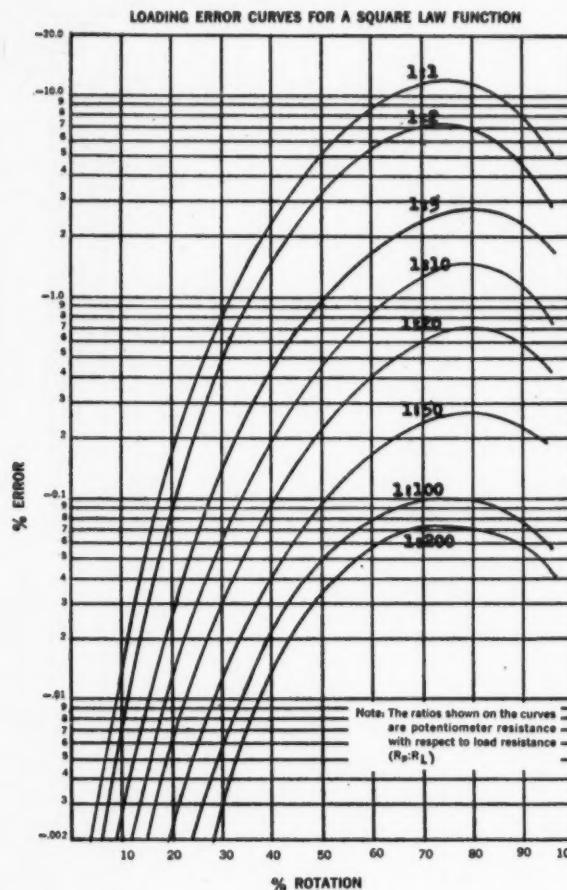
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MISCELLANEOUS

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